The Engineering and Mining Journal

WITH WHICH IS CONSOLIDATED "MINING AND METALLURGY."

VOL. LXXVII. NEW YORK, THURSDAY, MARCH 3, 1904. No. 9.

THE ENGINEERING AND MINING JOURNAL. ESTABLISHED 1860

PUBLISHED EVERY THURSDAY,

261 BROADWAY, NEW YORK

TELEPHONE 6865 CORTLANDT. P. O. BOX 1833.
CABLE ADDRESS "ENGMINJOUR" NEW YORK.

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DORTMUND, GERMANY . . . . . Arndt Strasse, 56

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To FOREIGN COUNTRIES, INCLUDING POSTAGE, $8.00 or its equivalent: 33 Shillings; 32 Marks; or 40 Francs.

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Entered at New York Post Office as 2nd Class matter.

CONTENTS.

Editorials:
Notes 347
Professional Privilege 348
February Dividends 348
Mining in Korea 348
The World's Iron Production 349
Market Conditions 349
The Remedy for Labor Troubles 350
The Texas University Mineral Survey 350
Steel Columns for Mill Building Construction .. 350

Discussion:
Treatment of Sulpho-Telluride Ores. *Philip Argall* 351
Acidic Magmas, Their Exhalations and Residues. *Blamey Stevens* 351
A Bureau of Mining ..... *George L. Cus* 351
Pyrite Smelting at Bingham, Utah. *Thomas T. Read* 351
Smelting at Sudbury ..... *Henry W. Edwards* 352
Pyrite Smelting ..... *Chas. H. Fulton* 353
Bessemer Smelting ..... *P. Wiseman* 353
Iron Ore Production in 1902 354
*Mining and Business Interests in Korea. *S. Herbert Williams* 355
A Method for the Direct Determination of Alumina ..... *C. E. Rueger* 357
Turbine Air Compressors 359
*The Power Plants of the Moctezuma Copper Company ..... *John Langton* 359
The Payne-Gillies Copper Process. *F. Danvers Power* 362
*The Nickel Deposits of Sohland, Saxony. *Walter Harvey Weed* 363
Lead Ore in Burnet County, Texas. *Wm. B. Phillips* 364
A Wollastonite Rock-Mass in Mexico. *H. F. Collins* 364
*An Electric Mining Hoist 365
Recent Literature of Economic Geology—Lead and Zinc ..... *H. Foster Bain* 365
Books Received 366
Books Reviewed 366

Correspondence:
Texas Oil ..... *James Spicer* 366
The Ground-Sluice Decision in California. *Edward A. Belcher* 367

Abstracts of Official Reports:
Tennessee Copper Company 367
Lehigh Coal & Navigation Company 367
*Questions and Answers 368
Recent Decisions 369

Patents Relating to Mining and Metallurgy:
*United States 369
Great Britain 370

*Illustrated.

DEPARTMENTS.

Assessments 383

Chemicals and Minerals:
New York 381
Foreign 382

Coal Markets:
United States 379
Foreign 380
Dividends 383, 386

Financial Notes:
Gold and Silver Movement 382
Prices of Foreign Coins 382
Industrial Notes 373

Iron and Steel Markets:
United States 380
Foreign 381

Metal Markets:
Silver 382
Copper, Tin, Lead, Spelter and Minor Metals .. 383
Average Monthly Prices Tables 383

Mining News:
Summaries: Denver; San Francisco 372
London; Melbourne, W. A.; San Luis Potosi, Mex.; Spokane; Sydney; Toronto, Ont.; Victoria, B. C. 372
United States 374
Foreign 378

Mining Stocks:
Market Reviews 378
Quotations 384, 385
Obituary 373
Personals 373
Schools, Technical 373
Societies 373
Trade Catalogues 374

EDITORIAL.

FROM THE REPORTS issued by the Carnbrea & Tincroft Mines, Ltd., it would appear that an important discovery of payable tin ore has been made recently, a fact which will be welcomed by all those interested in Cornish mining. The discovery was made at the 238-fathom level east of Highburrow West, and 580 tons mined have given an average yield of 50 lb. of black tin per ton. The vein is being actively opened out and the engineers state that it will yield large quantities of tin. This development is so encouraging that the directors have postponed the half-yearly shareholders' meeting, which is usually held this month, until sufficient development work has been done to prove exactly the value of the discovery. During the six months ended December 31 last, the average yield of the ore treated was the lowest on record, being only 22.68 lb. of black tin per ton. The number of tons crushed was 25,645, and the loss on mining and crushing was £4,594. The new discovery, therefore, comes at an opportune moment.

DURING THE LATE unpleasantness in South Africa, we became accustomed to considering a kopje as a focal point for military activity, so that it requires a twist of thought to regard them in the light of outcrops of valuable ore. However, in northern Rhodesia—near the Kafue river—there have been found kopjes consisting chiefly of the carbonates of lead and zinc, rising in bold relief out of a limestone formation. This discovery has been named the Rhodesia Broken Hill and photographs indicate that in appearance it does indeed resemble the great outcrop—now mostly mined and smelted—of the famous mine in New South Wales. This information ordinarily might be construed as one of the fairy tales born of the prospector's imagination, but in this case it comes from a mining engineer—Mr. T. G. Davey—of high standing in the profession. Apparently it is another of those recent discoveries which indicate that, despite many disappointments, Rhodesia, after passing through the measles of a boom with all its depressing sequelæ, and passing through that awkward age when railways are painfully wanting, is destined at last to become a great mining region.

THE REPORT OF THE Lehigh Coal & Navigation Company, the first of the important anthracite companies to make public its statement for 1903, shows that the cost of mining and preparing coal for market during the year was $1.734 per long ton. This is lower than in 1902, but costs then were unusually high, owing to the strike and the small output. A comparison with 1901, the last year of normal conditions, shows an increase of 20 cents, due almost entirely to the higher rates of wages now paid in the anthracite mines. There is no doubt that other reports will show a similar increase in costs.

This company reports for 1903 that 49.5 per cent of its output for the year was in the small, or steam, sizes of anthracite. This is the largest proportion of steam sizes we have ever noted, by any anthracite company.

IN REGARD TO pyrite smelting, the discussion of which is resumed vigorously in this issue, it appears that the Tennessee Copper Company purposes dispensing with roasting. The annual report—highly creditable to the management—contains the announcement that experiments on the smelting of unroasted or 'green' ore have been so successful that a change to this method will be gradually adopted during the current year; it is expected that "green ore smelting"—another synonym for pyrite smelting—will permit of a net saving of "not less than one cent per pound" on the copper produced.

THE REPORT of the Tennessee Copper Company, a summary of which is given on another page, shows excellent results, notwithstanding some drawbacks from the high prices of coke and supplies. With a production of 10,690,389 lb. of copper—an average of 37.615 lb. per ton of ore smelted, or less than 2 per cent—the total cost of metal was 9.16 cents per pound; while the average selling price was 12.98 cents. The company paid its first dividends during the year, and the management has decided to double the smelting plant.

The company's stock is now selling at a price which makes its valuation about $5,000,000. As there are also $500,000 bonds, the current market value of the property is about $5,500,000. As the company reports 2,775,000 tons of ore in reserve, and the average profit shown is $1.45 per ton, with 13-cent copper, the profit assured should be $4,023,750, or over 73 per cent of the current selling price. This considerably exceeds the proportion suggested by Mr. Curle, in his articles on the value of mines—that a mine should show 60 per cent of its market value in net profits from existing ore reserves. There is margin enough, in fact, to allow for some fall in the price of copper, and such a margin is undoubtedly necessary.

PROFESSIONAL PRIVILEGE.

Our London correspondent has already made reference to the withdrawal of the suit brought by the Etruscan Copper Estates Company against Messrs. C. Algernon Moreing and Edgar P. Rathbone. Both these distinguished engineers reported adversely upon the copper mines in Italy owned by the plaintiff company, and Mr. Moreing saw fit also to criticize severely the work at the mines, referring to it as "opera bouffe mining." The company brought action against both the gentlemen mentioned, but soon dropped proceedings; the directors, however, maintained their action against Mr. Moreing until a few weeks ago, when it also was dropped, the board finding sufficient solace in the fact that the criticism "did not imply a personal reflection." At the same time Mr. Moreing, through his counsel, stated emphatically that he stood by every word of his report. We present our compliments to him. It is most important that engineers should be free to criticize the policy and the management of mining companies when it lies in the line of their duty to the clients who engage them. Such freedom should not be abused—nor was it in this case, as far as we can determine—but if the statement of opinion by properly accredited mining engineers is to become actionable, then indeed one of the few protections possessed by the shareholders will be destroyed, and directors of an undesirable type will have their own way unhindered.

FEBRUARY DIVIDENDS.

FAVORED BY heavy quarterly payments, the total dividends reported by the mineral industry in February were more than double those of the previous month. Compared with February, 1903, however, there is a marked falling off, due primarily to the redemption of a large amount of 7 per cent preferred stock by an issue of 5 per cent second mortgage bonds by the United States Steel Corporation.

In February, 1904, dividends of $11,523,207 were paid by 47 public concerns, and of this amount 54.7 per cent, or $6,305,497, was the 1.75 per cent quarterly declaration on United States Steel preferred stock. The industrial dividends, amounting to $8,557,391, were swelled materially by the initial payments of 2 per cent each on the stock of the Fairmont and Somerset coal companies. These two concerns have lately been acquired by the Consolidation Coal Company, which has doubled the customary 2 per cent annual dividend.

There were 27 mines and metallurgical works that declared dividends amounting to $2,965,636. Of this five copper properties reported $1,998,431, principally by the Amalgamated group, of which Butte & Boston has made its first payment, at a reduced rate, since 1901. Twenty gold, silver and lead concerns, chiefly in Colorado and Utah, paid $665,705. Two zinc properties paid $301,500, and of this $300,000 represented the quarterly dividend of 3 per cent on the stock of the New Jersey Zinc Company.

In addition to the above, seven Mexican mines and mills reported $104,458, gold, led by the Peñoles Mining Company, which declares monthly 40 per cent on its capitalization of $250,000, Mexican. Two British Columbia mines paid $78,800 during the month.

MINING IN KOREA.

On another page we publish a timely article on mining in Korea by Mr. S. Herbert Williams, who has just arrived in New York from the very region now the scene of military conflict. By reason of the keen interest taken in the war and the consequent number of maps available to our readers, it has been deemed unnecessary to publish any map, such as ordinarily would be desirable in describing a region so far east of the Bowery. The Yalu is now as familiar as the Neva, and Wiju, Seoul and Chemulpo are places that literally "every schooolboy knows" at the present time.

Gold mining has become an important industry in Korea within the last six years; the region known to contain the precious metal extends from the hills bordering the south bank of the Yalu and reaches far into Korea, at least to Gwendoline, for example, which is 250 miles south of the Yalu. Two companies —the Oriental Consolidated and the British & Korean—are in active operation; the former is an American concession and has a mill of 240 stamps near Anju, while the latter possesses a 20-stamp mill and cyanide plant at Gwendoline. These are the only undertakings producing gold at the present time.

Copper is mined by the natives at several places and household utensils are made from it; but no foreigners are engaged in copper mining. Coal of medium quality is known to exist at tidewater. The Japanese are fully aware of the mineral resources of the region over which they now claim a protectorate and it is likely enough that they will have a good deal to say in regard to the granting of further concessions to foreigners. Japan requires iron ore, which is now imported from China, and Korea possesses a supply of this fundamental mineral.

At the present time, besides the Anglo-American companies already referred to, concessions have been granted by the Imperial household to German and Japanese syndicates; others will follow, for Korea cannot afford to discriminate against the other nations, with whom she has treaties, and the subjects of which are clamoring for an opportunity to exploit the undoubted mineral wealth of the country. But should the war end favorably to the Japanese, it is likely that foreign capital—that is European and American—will have

small opportunity to share in the development of Korea. "Korea for the Japanese" will be the dominant cry, and to such a sentiment the losses incurred by a war arising from a quarrel over the suzerainty of Korea will give added force. The outlook for mining undertakings in Korea depends upon the arbitrament of the present war.

THE WORLD'S IRON PRODUCTION.

We have now the returns of pig iron production in 1903 from the three principal iron-making countries, besides several of the less important ones. We are able to estimate closely the output of other nations, and the total production of pig iron in the world. From our figures it will be seen that there was, last year, only the moderate gain of 5.7 per cent over 1902, which was generally an active year. At the opening of 1903, prospects were good, but the second half of the year did not fulfil the promise of the first.

The following table shows the approximate production of pig iron in the world for two years past; the figures being reduced to metric tons, for purposes of comparison:

	1902.	1903.	Changes.
United States ...	18,003,448	18,297,400	I. 293,952
Germany	8,402,660	10,085,634	I. 1,682,974
Great Britain ...	8,653,976	8,686,701	I. 32,725
Total	35,060,084	37,069,735	I. 2,009,651
All other countries	9,497,907	9,625,000	I. 127,093
Totals	44,557,991	46,694,735	I. 2,136,744

The greater part of the iron estimated for other countries is produced in Europe; Austria, France and Spain made little change in their output last year; Belgium reports a considerable increase; while the Russian production probably decreased. In North America there was a falling off in the Canadian make.

The three leading producers turned out 79.5 per cent of the world's supply of pig iron last year, and together show an increase of 5.7 per cent. Nearly all of this gain, however, was due to the great advance in the German output. The United States and Great Britain were nearly stationary. The increase in Germany put that country in the second place, its make of pig iron passing that of Great Britain for the first time. A large part of the increase was taken by the foreign trade, the exports of iron and steel from Germany in all forms having gained largely during 1903; the trade being pushed even into British markets.

From present indications, the pig iron output of the world in 1904 will not exceed that of 1903. Quite possibly it may be somewhat less, for there are signs of diminished activity in trade in this country, and abroad it will be injuriously affected by the Eastern war, with the complication that may result, for contrary to a rather common belief, war diminishes all industrial activity and even in the iron trade a temporarily increased demand for guns, projectiles and other military equipment cannot offset the tonnage that would be required normally in the arts of peace.

MARKET CONDITIONS.

March 2, 1904.

The metal markets have not been specially active during the past week, except in the case of spelter.

In copper consumers are not taking very much interest in the market and business continues to be on a moderate scale, with prices again slightly lower. It is again reported that large quantities are being offered on the outside at a low figure by sellers here.

Tin shows some fluctuations, and it is upon the whole somewhat higher. Consumption is on but a fair scale.

Lead shows about the usual demand, and the price has been advanced $2 per ton. There has been some delay in deliveries, owing to the condition of the Western railroads.

Spelter is stronger and shows a very good demand, especially from galvanizers. The Joplin ore market also shows some advance, and competition among re-buyers is beginning to have effect.

Silver is rather quiet, but prices are steady. Buying for private account in India continues on a good scale.

The iron markets continue generally quiet, although there are indications of a revival of buying in certain finished products; for instance, rails, plates and bars. As regards pig iron, there is less change, but the general situation has been greatly strengthened by the reported purchase of 100,000 or 130,000 tons of bessemer pig by the United States Steel Corporation. The price mentioned is $13 Valley furnace, the Bessemer Furnace Association to get one-half the order and independent furnaces half. In foundry irons the market is no stronger, owing to the activity of Southern furnaces in taking orders at the recent 50c. reduction in prices.

Lake Superior ore producers held another meeting to reach an understanding on prices for the coming season, but adjourned without date for another call. The differences between the leading interests and the small producers were radical.

The Western coal trade shows a decidedly stronger tone. The joint conference of miners and operators in convention at Indianapolis may agree on a mining scale for the coming year, but the outlook is reported very doubtful. It is even said that some operators might desire a strike of a few weeks' duration in order to dispose of stocks of coal now on hand. In Chicago territory, Indianapolis and Illinois coal is especially wanted; at Pittsburg prices are firm, and at Cleveland prices have advanced an average of 5c. a ton.

In the seaboard bituminous trade the conditions of poor car supply and slow transportation that affected the market last week continue. The labor situation will be entirely controlled by what is done at Indianapolis.

The anthracite trade, all over the country, is better than at any time this winter.

METALLICS.

Culled from all sources. Our readers are invited to assist this department by sending similar material.

Hypotheses are the crutches of science, to be thrown away at the proper time.

An element is that which has not been decomposed, so far as we are aware, into anything other than itself. In short, it is consistent.

Man being servant and interpreter of nature, can do and understand so much and so much only, as he has observed in fact or in thought in the course of nature. Beyond this he neither knows anything nor can do anything.

Doubtless there will, by and by, be laws as far transcending those we know as they do the simplest observations.

Striking facts and novel fancies, gleaned in the realm of inorganic chemistry, have crested not a few of the high waves of those human tides that beat against the coasts of the untried and unknown.

There exists in the universe some thing or things other than matter which, by association with it, give rise to the changes in properties which bodies exhibit, and give them power of producing changes in the properties of other bodies.

The Cordilerra of North and South America, respectively, are not part of a continuous continental backbone. The North American mountain range terminates abruptly with the great scarp of the Mexican plateau, in longitude 97° W., just south of Mexico City.

South America is east of North America; the Isthmus runs east and west. The Andes end in Colombia, the Rocky mountains in Mexico; their termini, if protracted, would pass in parallel lines nearly 2,000 miles apart.

The Gulf of Mexico is an indentation into the North American continent; it is the survival of a great interior sea which once almost separated North America into two great prehistoric continents, the Appalachian and the Cordilleran.

The Caribbean Sea and the Gulf of Mexico together form a deep and well-defined marine basin, more completely closed on the Atlantic side than is apparent on the map. The islands from Florida to the mouth of the Orinoco are merely the summits of steep submarine ridges.

So rapid are the strides made by science in this progressive age and so boundless is its range, that those who view its career from without find great difficulty in following its diverse and intricate pathways, while those who have secured a footing within the same road are often quite unable to keep pace with its fleet movements, and would fain retire from the unequal contest.

THE REMEDY FOR LABOR TROUBLES.

At the recent meeting of the American Association for the Advancement of Science, at St. Louis, Mr. H. T. Newcomb made the following suggestive observations on some phases of the labor problem:

Obviously the demand is for a temporary remedy for a difficulty which ought ultimately to disappear. With this fact kept carefully in view, it is safe to consider the remedy of arbitration. This has actually but one form. To be arbitration at all it must be wholly voluntary. The term compulsory arbitration is self-contradictory, and however it may be disguised, it really means the creation of a new type of court endowed with authority to make contracts relating to labor services.

Arbitration—voluntary arbitration—is a term so grateful to the ear to which it comes as a substitute for the clash of bitter industrial struggles that it seems ungracious not to commend it without qualification. If men cannot agree, what can be better than to submit their differences to the settlement of a disinterested and impartial third party? If men cannot agree. This qualification begs the entire question. Reasonable men can agree, and unreasonable men must become reasonable or be replaced, in industrial affairs, by those who are. One way in which unreasonable men arrange for their own replacement is by getting themselves into situations out of which they cannot be extricated except through the assistance of others.

The adjustments of industry are too delicate to endure, without injury to all concerned, the frequent interference of the disinterested. A strong personal interest is the element which is most effective in preventing irreparable mistakes. Arbitration may be the smaller of two evils, but no one should fail to recognize it as an evil. Aside from the fact that it leaves the determination of matters of primary industrial importance to persons who will neither gain nor lose by the success or failure of the industry, it is evil in its consequences, because, when there is reason to rely upon its being arranged for, that fact constitutes an incentive to making, and insisting upon, unreasonable demands.

The easy-going policy which consents to the submission of questions vitally concerning the welfare of an enterprise to persons who have no stake in its success naturally leads to the easy-going method on the part of arbitrators which is expressed by 'splitting the difference' between the conflicting demands of both of the contending parties. This is the almost uniform result of arbitration.

If you will turn to the decision and award of the recent Anthracite Strike Commission you will find that that ablest and most impartial of arbitration boards was not able to avoid this nearly inevitable result. In its pages you will read the contradiction of every substantial averment of the striking mine-workers. You will find that the wages of the employees of the anthracite operators did not, in April, 1902, compare unfavorably with those of bituminous miners or men in other employments of similar character. You will find that the conditions of life and the standard of living in the anthracite counties of Pennsylvania were not lower than in comparable regions. You will find that the basis of payment was not unfair to the workmen. You will find the United Mine Workers described as a body too strongly influenced by bituminous coal interests to be a safe factor in the anthracite industry. You will find that boys voted in its meetings and gave a reckless tone to its management. You will find that the period of the great strike was one of lawlessness and violence, which the leaders of the organization could not or, at any rate, did not effectively check.

So much the gentlemen of the commission gathered from unimpeached and unimpeachable testimony, and so much they clearly, concisely and fearlessly set down in the permanent record of their arduous and graciously accepted task. But after bravely announcing these facts in terms quite equivalent to declaring that the strike had no justification, the commission yielded, as any other arbitrators would have yielded, and as nearly all arbitrators will yield in future controversies, to the impulse, commendable in itself, to deal generously with those who have relatively little, and awarded a general advance in wages.

But if voluntary arbitration is no more than a temporary and rather dangerous makeshift; and compulsory arbitration is utterly to be condemned, what can be done? The answer has been given—men must learn to bargain together reasonably. The remedy ought to appeal to us more because it is a process and not a panacea for all the ills of industrial conflict. That men can learn to settle their disputes over wages without outside aid, and that unions can make and keep collective bargains, has been abundantly proven during the recent industrial experience of the United States. All that is required is that there shall be more of this reasonableness and much less of its opposite. That this will come with the growth and spread of intelligence there need be no doubt.

THE TEXAS UNVERSITY MINERAL SURVEY.

The University of Texas Mineral Survey, under charge of Dr. Wm. B. Phillips, has undertaken an active campaign with a view to making known the mineral resources of the State. Lectures are delivered in various cities and towns, and they are accompanied by stereoscopic views. In the field work of the last three years the Survey has collected a great number of photographs, and lantern slides have been made to illustrate deposits and workings of coal, lignite, building-stone, oil, sulphur, clays, quicksilver and other minerals. The Texas Fair Commission is co-operating with the survey, and these lectures are attracting a great deal of attention.

The work of the Survey, as outlined for 1903, will include a further study of the new quicksilver field in Brewster county; a study of the Christmas mountain coal-field in Brewster county; the preparation of topographic maps of the Texas oil regions, in co-operation with the United States Geological Survey. Work has also been begun upon a comprehensive report on the coal measures of the State.

Calaverite, the telluride of gold, when pure, contains 44.5 per cent gold and 55.5 per cent tellurium. It is named after the county of Calaveras, in California, where it was first found at the Stanislaus mine, in 1868. Professor F. A. Genth assigned the name of this mineral and described it in *American Journal of Science,* Volume XLV, page 314.

STEEL COLUMNS FOR MILL-BUILDING CONSTRUCTION.

The forms of steel columns commonly employed are two channel beams, back to back or face to face, laced together; two channel beams, back to back, joined by two plates riveted to the outer webs of the channel beams; two channel beams, back to back, united by an I-beam; four Z-bars united by a plate; four angle-bars united by a plate; four angle-bars laced together; a single I-beam; a single angle-bar; a single I-beam of special form, rolled with deep flanges so as to have an H section; four angle-bars, box-laced; four angle-bars, starred. Besides thees there are the special columns known as the Larimer and the Gray.

For side columns, where the loads are not excessive, four angles laced is probably the best, but under certain circumstances the column of four angles united by a plate is to be preferred. A single I-beam makes a good end column when proper connections are made. The best column for the corner of a building is an equal-legged angle with 4, 5 or 6-in. legs. Columns made of two channels laced, or two channels and two plates, are used where moderately heavy loads are to be carried. The former form, wherein the channel beams are turned back to back, is most commonly employed, but the same form wherein the backs of the channels are turned out gives a better chance to make connections. The shop work on the latter used to be more than on the former, but this is no longer the case. The column composed of two channel beams united by two plates is a closed section, and is seldom used on that account.

For the support of very heavy loads the column made of two channel beams and one I-beam, or that composed of four Z-bars and a plate, is commonly used, the former being a very economical one and especially advantageous, since it can be built up of material that is always easily obtainable. Connections for beams can easily be made with either of these forms of columns. The special I-beam column with flanges equal to the depth of the beam is now being rolled in Germany; this is an almost ideal column for heavy loads, having all the advantages of the Z-bar column with a very much smaller shop cost. Columns made of four angles box-laced are used where light loads are to be carried by long columns. The column formed of four angles starred, which is frequently used, is a poor design, inasmuch as the radius of gyration is very small for the cross-sectional area. Columns made of two angles, starred and fastened at intervals of two or three feet by means of batten-plates, are frequently used for light loads. The Gray and Larimer columns are patented forms. The latter is used rather extensively; the former is but little used.

NEW CALEDONIA CHROME ORE FOR AMERICA.—The receipt of several large cargoes of chrome ore from Noumea recently, free of duty, and paying an ocean freight of about 24s. ($5.76), suggests competition with Turkey. Ordinarily, New Caledonia produces about one-third the quantity annually exported by Turkey, but lately there has been progressive development of the deposits. The ore from New Caledonia frequently contains from 50 to 56 per cent chromic sesquioxide; sometimes it is too low for profitable export.

DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the ENGINEERING AND MINING JOURNAL.

TREATMENT OF SULPHO-TELLURIDE ORES.

The Editor:

Sir.—I observe from Mr. Hoover's letter, published in the JOURNAL of January 21, that while he does not call in question either the accuracy of my offending quotations, or the correctness of my data, he declines to further discuss the non-roasting Diehl process as a factor in Kalgoorlie ore treatment. In the light of recent articles on this interesting subject, published in your JOURNAL, he shows wisdom in following this course.

Mr. Hoover now desires to divert this discussion, which he himself started, to the merits and efficiency of Kalgoorlie and Cripple Creek dry-crushing-roasting plants. I do not see that any useful object would be gained in following this suggestion, more especially as I set no limits to the ultimate possibility of either the wet or the dry-crushing process; no doubt they are both susceptible of improvements and will be improved. From the experience I have had in the treatment of sulpho-telluride ores and for the reasons previously given, I have no hesitation in repeating my statement, that the dry-crushing-roasting process, as against the non-roasting, so-called Diehl process, "must prevail at Cripple Creek, as in my opinion it will ultimately prevail in Kalgoorlie." As to the combination (wet-crushing, concentrating, roasting, amalgamating and bromo-cyaniding) process, I believe it offers, as a whole, no superiority over the dry-crushing-roasting process; in fact, that it is not as good; hence in my opinion the dry process will ultimately prevail on both goldfields. However, both processes are good, and much depends on the ability, energy and skill of those in charge of the mills, as well as in the completeness and efficiency of the rival plants. Lavish use of capital often for a season pushes an inferior process to an apparently superior position, so we must wait for the verdict of time.

PHILIP ARGALL.

Denver, Feb. 19, 1904.

ACIDIC MAGMAS, THEIR EXHALATIONS AND RESIDUES.

The Editor:

Sir.—Studying acidic magmas from the point of view I advanced in a recent letter concerning basic magmas, we are brought into contact with many criteria which might prove useful in determining the origin of particular mineral deposits.

It is generally recognized that the great unaltered granite masses have cooled in a wet condition and have thrown off the gaseous liquid matter on solidification. Quartz is usually the last mineral to crystallize in granite, and as it has a higher melting point than any of the other minerals, it is evidently held in solution at the time of its deposition by some substance foreign to the rock, such as water, etc. In graphic granite the feldspar and quartz have both crystallized at the same time, and we are led to suspect that this relatively rare type of granite has little or no residual gaseous liquid matter. When it is noticed that this type always occurs in dikes, and is an exact parallel to the solidified eutectic mixture which are all final products of the solidification of solutions we ought to need no further proof. It may, however, be noticed that the usual feldspar of graphic granite is microcline, while that of ordinary granite is orthoclase; these are allotropic modifications of the same chemical compound, and the phenomenon is parallel with the occurrence of augite and hornblende respectively in dry and wet basic rocks. With the porphyries the 'ophitic' and 'micro-pegmatitic' structures take the place of the graphic structure in granites.

It may be useful to speculate on the relative properties of wet and dry acid magmas. As with the more basic rocks it is evident that if water escapes from the molten magma, it does so in the form of a gas or vapor, and takes with it other volatile substances such as excess of sulphur, chlorides, etc., but no great amount of base metals or quartz; these are left in the magma and may, perhaps, be subsequently leached out. Acid magmas will, however, be much more viscous than basic ones, and consequently diffusion will be slow and fractional crystallization less. The behavior of the wet magmas will be similar to that of the wet basic ones, except that the residue will contain more quartz and less base metal, and this may affect the mode of deposition of the mineral contents.

One general conclusion which ought to be considered as a first principle may be mentioned, namely, all magmas are primarily wet, and dry magmas are formed only in regions of low pressure.

BLAMEY STEVENS.

Valdez, Alaska, Jan. 30, 1904.

A BUREAU OF MINING.

The Editor:

Sir.—I have been much interested in the discussion in the JOURNAL upon the subject of a Mining Bureau and it seems to me that Mr. Parker's statistics in your issue of February 18, are the most valuable contribution we have had. He gives the number of economic geologists now employed as 58, with whom, I suppose, would be associated about half of the 94 topographers. Surely this is enough for regular and persistent work, and the real question is whether a special bureau of mines would improve on the present conditions.

We all know what the history of the Survey has been. The lamented King desired to make it an institution for the study of economic geology chiefly and the valuable monographs on the Comstock, Eureka, Lake Superior, Leadville, etc., attest the strength of the impetus he gave. Then followed a time when monographs on paleontology, paleobotany and general geology unconnected with mining outnumbered the papers of economic importance so completely as to arouse Senator Wolcott's energetic remonstrance. His protest ushered in the *glanz period* of the Survey so far as benefit to miners is concerned. Now we seem to have fallen on another period of practical neglect. I say practical neglect, for there is no doubt that the Survey has continued to do good and valuable work for the miners. Recent bulletins have informed us of studies in various fields, as, for instance, the copper districts of Arizona, which have especial interest just now, but though one or two years have elapsed since these studies were completed the results have not been published.

It seems to me that this is the especial defect of the Survey at the present day. It has geologists enough, and they are able and active. There are enough of them to carry on the great work of the geological map of the country and the study of special fields also, but for some reason the fruits of their work are hidden away and not given to the world. The question is, would a bureau do better?

While your correspondents have written interestingly about the projected bureau not one of them has given us any reason to think that the bureau would publish more than the Survey. Certainly we could not expect the bureau to gather a larger or better staff than the gentlemen now in the Survey. It would, in fact, have the same men and would be lucky to have such a body of experts. I am not able to discuss the subject, for the reason that I do not know why publication lags so far behind examination in the Survey and until some one explains this or gives us cause to hope for better things from a Bureau composed of the same men, working under the same system of appropriations, I must feel that the change might be made without producing any improvement.

GEO. L. CUS.

New York, Feb. 20, 1904.

PYRITE SMELTING AT BINGHAM, UTAH.

The Editor:

Sir.—A good example of the smelting of raw sulphides of iron and copper, utilizing the heat of combustion of the sulphur content to replace a portion of the coke usually required, is seen at the plant of the United States Smelting Company at Bingham Junction, about 15 miles from Salt Lake City, Utah.

This plant is at present smelting about 700 tons daily, but the work of enlarging it to 1,000 tons capacity is already under way. The larger part of this tonnage is derived from the company's mines at Bingham cañon, but ores from the Boston Consolidated are also being smelted. The ore is of two classes, a silicious ore that presents no especial difficulties and a sulphide ore that breaks up into fine particles and gives rise to the difficulties which are always met in the smelting of fine ore. The average content of the two ores is about 2 per cent copper and nearly equal values of gold and silver.

The plant has only been in operation about a year and is essentially modern and up to date in every particular. Being situated on the eastern side of the valley of the river Jordan it has the sloping site necessary for the ellipsoidal arrangement of track and ore bins which characterizes the late designs of smelting plants. The smelter and converter houses, or house, for they are under one roof, are of structural steel and sheet iron, the power-house is of brick and the ore bins are of the usual timber construction.

The ore is delivered at the smelter from the mines in 50-ton cars and goes first to the sampling bin and then to the storage bins. These are provided with hopper bottoms and Fairbanks track-scales beneath. These scales are set at the desired weights in the usual way and the charging cars, drawn in a train by an electric locomotive, are weighed directly as they are being filled. From the bins the trains

go to the charging floor, where the cars are dumped on a shoveling plate. As designed, it was intended to charge the furnaces directly from the cars, but this was found unsatisfactory and changing by shovel was substituted. A slight change has been made in the design of one of the furnaces and automatic charging is to be again tried.

The furnaces are five in number (four in blast), 42 in. by 180 in., water-jacketed with round brick settlers. Apparently the width is a little too great under the circumstances—that is, with a charge containing a good deal of fines and a highly silicious slag—for it renders necessary a high blast pressure (30 oz.), which, in conjunction with the finely divided condition of the ore, makes an excessive quantity of flue-dust, so much indeed that it is difficult to handle. Having to put all this back through the furnaces, after briquetting, tends to increase the trouble. The fines and high blast-pressure cause unequal distribution of the heat and the not infrequent barring-off of the walls is a necessary consequence. With such a high blast-pressure the end tuyeres on the sides would cause a chill if allowed to remain open, and are therefore kept plugged.

The heat of combustion of the sulphur allows the coke to be cut to 6 or 7 per cent. A hot blast has been used on two of the furnaces with apparent success, but the hot-blast stove has required closing down for repairs so often that no results that are really conclusive have so far been obtained. No attempt is made to utilize the heat of the flue-gases. The flue is constructed of brick, with sheet steel downtakes. These latter were at first made of 6 ft. diameter, but, being the cause of a very gassy charging floor, were replaced by others 7 ft. in diameter with a marked improvement.

The first matte from three of the furnaces averages about 15 per cent copper and is cast in the usual way. It then goes back to the fourth furnace, together with a nearly equal percentage of ore. The matte from this furnace runs from 25 to 30 per cent copper and goes directly to the converters, where it is blown up to blister copper. This is then cast into pigs and shipped to an eastern refinery. The casting of anode plates is not practiced at any plant in the district.

A large economy in the handling of the slag is effected by granulating it. The granulated slag is led into two settling tanks, alternating from one to the other, so that while the slag is being removed from one tank the other is filling. These tanks are fitted with hopper bottoms, so that the slag larry can be brought beneath and filled directly. The slag is then trammed to the southern end of the property and dumped there. There is sufficient fall to allow of wasting the slag directly from the end of the flume, but the fear of allowing it to enter the Jordan river has so far prevented this. The water for the granulation of the slag and the general supply of the plant is obtained from a ditch taken out of the river some distance upstream. As the formation of anchor ice in winter and irrigation in summer are likely to diminish this supply a pumping system has been installed, which is capable of supplying the entire plant from the Jordan river directly opposite the plant. In addition there are three artesian wells which are pumped by the Poehle system into elevated tanks to supply water under pressure where it is needed and for fire protection.

The matte is tapped directly from the settlers into 10-ton pots which are handled by an electric crane. The first matte is cast in molds on a casting track, the second is delivered directly to the converters, of which there are two, of the cylindrical or 'trough' shape. These hold one potful of matte and have a hydraulic tilting device which is actuated by a small Worthington pump. Silicious ore is ground in a pug-mill with just enough clay to give it the right consistency, and is then used for the converter lining. It is rammed into place by an 1¾ in. Ingersoll rock-drill which is fitted with a tamping iron in place of the drill bit. The drill is suspended from a small jib-crane allowing ready adjustment to the work. The converter shells are handled by the electric crane and only about ten minutes is required to remove a shell from the chairs and substitute another for it.

The slag is poured at intervals during the blow, which lasts about two hours, the progress of the skimming being watched by dipping an iron paddle into the issuing stream at frequent intervals, and noting when spots of matte appear on it. The termination of the blow is known by the appearance and sound of the issuing flame, as in the bessemerizing of steel. The small amount of slag remaining on the surface at this stage is kept back by throwing some of the rough fragments of copper from the previous casting into the mouth of the converter. In this way clean pigs are obtained. Naturally with such a low-grade matte a great deal of patching of the lining is required and the lining has to be frequently renewed so that a gang of men are kept constantly busy preparing and applying converter lining. A blast pressure of 13 lb, furnished by a piston blower, is used at the furnaces.

The entire power plant is of Allis-Chalmers design and construction. Cross-compound Corliss engines at 145 lb. steam pressure are used for the blowers. The electric power is furnished by a tandem compound Corliss which is belted to a direct current and an alternating current generator, the direct current being used for the tramming system and the electric crane, the A. C. being used for all other purposes,—as for instance, the driving of the briquetting machine, the furnishing of power for the machine and boiler shops, lighting, etc. The Corliss engine has been running, at 120 revolutions per minute, a year, with only a shut-down of a few minutes each Sunday. A Westinghouse engine is being installed in order that an accident to the Corliss may not cause a shut-down of the whole plant. A Rand compressor supplies the air for the tamping machine and for pumping the artesian wells.

The boiler plant consists of four Sterling units delivering 1,500 engine horse-power. They are fitted with Roney automatic-stokers and the ashes are sluiced away along with the slag, so that two men are amply sufficient to take care of the plant. The Roney stokers give good satisfaction, although not an absolutely smokeless combustion.

The briquetting plant is chiefly interesting because of the amount of work it is called upon to perform. Slacked lime is used as the binding material and a fair quality of briquette is obtained. The method of sampling the blister copper is worth a passing note. The assay sample is taken near the middle of the pour. The samples taken during a day are carried to the machine shop the next morning and cut completely in two on a diagonal line by a planer. From the chips thus obtained the assay sample is taken.

A little less than 200,000 lb. of copper per month is the usual product of the plant. It is a great financial success, and thus, under the circumstances, bears eloquent testimony to the excellence of its design and the efficiency of its management.

THOMAS T. READ.

Laramie, Wyo., Feb. 16, 1904.

SMELTING AT SUDBURY.

The Editor:

Sir.—In the current number of the JOURNAL I see that Mr. A. McCharles, of Sudbury, refers in a rather complimentary manner to the work done some 12 or more years ago at the smelter belonging to Messrs. H. H. Vivian & Company, at the Murray mine. He is quite right in his main facts; and as this plant was rather a pioneer in a small way, it may be of interest to give a few particulars concerning it.

To the best of my knowledge and belief it was the first plant to tap matte direct from the blast furnace to the converter, and it was there that the first trough-shaped converter was used in North America. Prof. Douglas in a pamphlet entitled 'Bessemerizing Copper Mattes' is good enough to give the undersigned the credit of being the first to operate this style of converter.

The smelter originally consisted of two old-style round Piltz furnaces, 60 in. diam., three converters, a small vertical engine driving a Schicle fan, and a simple horizontal blowing engine. The idea of the fan was to produce a large volume of blast with a view to enriching the matte by oxidation of a part of the sulphide of iron in the ore. However, one of the Piltz furnaces was soon replaced by an oval furnace designed by the writer with a single eye to low first cost. If I remember correctly, it cost about $2,000 erected. Its greatest length was about 90 in., its width 33 in., with a 3-in. water space and vertical sides. It was blown by a Baker blower, No. 6, I think, and its capacity was about 600 to 800 tons per week of roast-heap stuff. The matte was tapped direct into small trough-shaped converters, each mounted upon a traveling blowing stand; after receiving its charge the converter was moved along the track (by means of hand-cranks operating gear and pinion on the driving wheels) to the blowing hood. The usual charge of matte was about a ton or a ton and a quarter for a converter with a fresh lining; with an old lining they would take three tons and over. Blowing was continued until practically all the iron was oxidized, the product being a copper-nickel matte containing very small amounts of iron sulphide. The converter slags usually assayed 2 per cent nickel, and over, and were returned to the blast furnace.

The plant was simple in the extreme; it cost about $25,000 or $30,000; its capacity being about 600 to 800 tons of burnt ore per week, in addition to taking care of all the converter slags. It cost to operate about $2,000 per week, including roast-heaps. About half, or rather more, of this, was for fuel. The cost per ton of ore for the whole series of operations, burning, smelting and converting was about $3 on an average, including all the ordinary repairs and renewals.

The ore was very low grade, running about 1.5 per cent nickel and about 0.75 per cent

copper, so that I had to be very careful not to let the slag assays run too high. I am glad to hear from Mr. McCharles that they have not yet been beaten in the district.

At the time this plant was running the price of nickel was about half the nominal quotation of to-day; this, coupled with the cost of mining, the small scale of operations and the disadvantage of an administration 4,000 miles away, all combined to make the venture rather discouraging; and after some four years of existence it was finally given up. If current prices of nickel could be guaranteed it would pay to reopen the property, as there is still in the mine plenty of ore of the grade then worked. Very little work was ever done underground below 50 ft. and none at all below 100 ft. During the year 1892 I tried there several experimental runs with crude ore, the more modern 'pyritic smelting' in fact; but the results were not at all satisfactory, chiefly owing to the failure to get a matte of suitable grade for the converters.

HENRY W. EDWARDS.

Grand Junction, Colo., Feb. 17, 1904.

PYRITE SMELTING.

The Editor:

Sir.—I take pleasure in replying to the ten questions submitted in regard to pyrite smelting. I have read with much interest the replies given to these questions by the metallurgists taking part in this discussion, noting how their experience compares with that gained by me at the smelting plant at Rapid City, South Dakota.

What types of ores are suited to the process? Ores containing sufficient sulphides of iron; either pyrite, pyrrhotite, etc., or copper sulphides are suitable. Also, probably, arsenical pyrite. The question is, however, a wide one, for ores partially oxidized and containing but little sulphur can be handled without difficulty. A rather exceptional case is presented by the practice at Rapid City and Deadwood, where the dry silicious ore of the Black Hills is smelted with barren pyrite, limestone and a little copper ore. It might be said that any ore mixture containing sufficient sulphur to form matte with iron and copper and with sufficient silica to form a rather high silicious slag is suitable. But little or no lead and but little zinc should be present. Any lead present would be lost, aside from causing heavy silver losses.

Is hot blast advisable?—Regarding the saving of fuel by the employment of hot blast I cannot speak from experience. At Rapid City, what might be called a warm blast is used, the blast being heated in a U-pipe stove placed in the dust-chamber directly below the downtakes. The temperature of the blast is usually about 130° F., not enough to materially affect the fuel consumption. Hot blast however possesses one notable advantage, increasing the oxidizing effect of the furnace, permitting a greater desulphurization and hence a higher concentration. This may become a vital point in the smelting of low-grade ores.

To what extent can fuel be eliminated?—I have no experience on this point. In the Black Hills the production of highly silicious slags, with the feeding of just enough pyrite to furnish iron for the slag and matte, and sulphur for the matte, calls for considerable fuel. Also, the grade of coke used, for the most part Wyoming coke containing 30 per cent ash, aside from being but loosely coherent, precludes much experimentation on this point. The amount of fuel used amounts to about 10 or 11 per cent of good eastern coke.

What amount of copper is needed for the collection of the precious metals?—That depends upon what amount of slag loss the plant can stand. It is evident that when only the silicious ore going into the furnace is productive, and the limestone and pyrite being added are barren, the slag loss per ton must be very low. At Rapid City it was endeavored for some time to smelt without copper ore, with the result that the slags would invariably run from $1.50 to $2.50 in gold and 0.5 oz. silver. The addition of copper ore immediately remedied this. Copper ores are procured from Montana, and are added in just sufficient quantity to give the desired result. The minimum amount of copper added is 10 lb. for every one ounce of gold present in the charge, and more if available.

The first matte made usually contains from 10 to 14 per cent copper, 4 to 5 oz. gold, and 6 to 8 oz. silver. This is re-smelted twice, until the shipping matte reaches a value of 20 to 22 per cent copper, 17 oz. gold and 22 oz. silver. The re-smelting of the matte also furnishes somewhat more copper for some of the charges. The loss of silver becomes very noticeable when the copper contents of the matte drop below 8 to 10 per cent. In my opinion but few plants can smelt without any copper ore.

What percentage of lime is necessary to give a clean slag?—Lime is necessary for a mechanically clean slag, that is, a slag free from entangled matte. Lime reduces the specific gravity of the slag, letting the matte, low in specific gravity, settle out completely. The amount of lime in the slag depends upon local conditions. At Rapid City the slag made has the following composition: lime, 28 per cent; ferrous oxide, 18 per cent; alumina, 4 to 5 per cent; silica, 49 to 50 per cent. Some of the lime could be replaced with profit by magnesia up to 8 or 10 per cent. Lime slags of the composition quoted flow very freely and smoothly from the furnace, and allow a perfect separation of the matte. High silicious slags of this type, when produced with copper in the furnace, are very clean. They have a usual value of 20 to 30c. in gold and 2 oz. silver.

What percentage of zinc in the charge can be treated profitably?—I have no experience with zinc in pyrite smelting.

What degree of desulphurization is obtainable?—At Rapid City the desulphurization is between 75 and 80 per cent of the total sulphur in the charge. I believe a greater degree of desulphurization could be obtained if necessary. The furnaces used contract but little at the tuyeres and have a strongly oxidizing action. The matte-fall, with this desulphurization, amounts to between 4 and 5 per cent of the total charge. This is found amply sufficient for the collection of the values, giving a clean slag.

The capacity of the furnace?—This is much less than furnaces running on partially roasted ores. A 38 by 144-in. furnace will take about 150 tons of burden per 24 hours, with considerable amounts of fines present. With good lump ore and good coke, a furnace of the above size should take 200 tons.

What are the limitations of the process?—Pyrite smelting is limited to the ores discussed under the first question.

What is the relative economy as compared to rival processes?—That depends much on local conditions. At present the pyrite smelting plants of the Black Hills could not profitably handle silicious ore of less than $15 per ton, bearing in mind that this is the only productive material going into the furnace. In other districts, where conditions are more favorable as regards fuel and ore supply, pyrite smelting would seem to be a serious rival of other smelting processes, of water concentration, and even of chlorination and cyanidation, for even comparatively low grade ores, on account of the high saving made.

CHARLES H. FULTON.

Rapid City, S. D., Feb. 8, 1904.

BESSEMER SMELTING.

The Editor:

Sir.—In your issue of February 4th you have an editorial entitled 'Pyrite Smelting,' and Mr. Godshall presents an interesting contribution upon the same subject. You make the suggestion that this term be used when referring to the "oxidizing smelting of pyrite ores in a shaft furnace." Such designation would probably be more satisfactory than 'raw sulphide' smelting, but in reviewing the reasons given it seems to me that even 'pyrite smelting' does not fittingly describe the operation. In the minds of those interested in the smelting of copper sulphide ores there is indelibly associated with the word 'bessemer' the oxidation of sulphur and iron and the utilization of the heat thus generated. As this is the chemistry of the process which has been variously referred to as 'pyritic,' 'sulphide,' 'raw sulphide,' 'matte' and 'pyrite' smelting, it would seem more appropriate to speak of it as 'bessemer' smelting, and I would therefore suggest the use of that term.

This designation describes the process and at the same time implies the character of the material treated, and likewise the product of that treatment, at least when converting is the last stage of the process. The term would seem to be both comprehensive and distinctive. It is broad enough to cover every type of ore from which enough heat can be generated by the oxidation of its sulphur (and iron) contents to do away entirely, or as far as possible, with the use of carbonaceous fuel in shaft-furnace smelting. If further explanation is desired one can speak of bessemer smelting of pyrite, pyrrhotite, chalcopyrite, etc. Confusion can scarcely arise on account of the bessemerizing of matte as this operation is almost universally spoken of as 'converting,' and as for the product, it is certainly none the less bessemer copper because the same reaction has been employed in each operation throughout the process.

The use of this term would not necessarily imply that carbonaceaus fuel was entirely eliminated, but that as full use as possible was made of the heat caused by the oxidation of the sulphur (and iron) contents of the charge. Bessemer smelting would have reference to an oxidizing reaction only. Mr. Godshall calls attention to the fact that the term 'raw sulphide' smelting is particularly inappropriate in cases where the sulphur contents are so low that it becomes necessary to maintain a reducing atmosphere in order to obtain

a matte product. In such instances the term 'bessemer smelting' would not be proper, and the operation would probably continue to be spoken of simply as 'matte smelting.' If it were desired to make a further distinction between the processes of matte smelting, the expression 'bessemer matte smelting' would answer for the oxidizing method.

Bessemer smelting may, therefore, be defined as follows: Bessemer smelting is the smelting of heavy raw sulphide ores in a blast furnace, by means of an oxidizing atmosphere, and the utilization of the heat generated by the oxidation of the sulphur and iron contents of the charge to reduce to a minimum, or entirely do away with, the use of carbonaceous fuel.

With regard to the use of hot blast, its apparent advantages at the plants where it has been put in use, does not seem to have received from those interested in smelting the careful consideration they would seem to deserve. That, under the conditions prevailing at some of the plants, the use of hot blast has been a commercial success will probably not be questioned. It is not just to condemn hot blast unless a test of both has been made upon the same ore, and under conditions fair to both, and the hot blast has failed to give the desired or expected results. That upon another ore, and possibly under the most favorable conditions, one has been able to smelt with as little coke and with as large a capacity per square foot of hearth area as some one else using hot blast is simply negative evidence. Possibly the use of hot blast might have given even more favorable results. It is unusual for a process to give equally satisfactory results upon all ores; the process must be adapted to the ore and the working conditions. It seems reasonable to suppose that with fuel considerably cheaper than coke it would be less expensive to heat the blast outside, instead of inside, the furnace, and that with the probable reduction in the quantity of coke used, the ore capacity of the furnace would be increased. However, in heating outside the furnace the problem is to avoid excessive losses from radiation and otherwise, but when attention is given to this matter it will probably be satisfactorily solved. I have seen no data as to the test of hot blast at Butte, but I have the impression it was found unsatisfactory because the saving of coke effected was offset, or more than offset, by the expense of heating the blast outside the furnace. At the time the test was conducted were efficient steps taken to prevent excessive losses by radiation in the hot blast stove? At all smelting plants there is a great amount of heat going to waste, and it would seem that every smelter superintendent would make an effort to use this waste heat in the heating of the blast, or for some other purpose. If the installation of boilers in connection with reverberatory furnaces, at Anaconda, proved satisfactory, it is a distinct advance. While the utilization of escaping furnace gases might not heat the blast to as high a temperature as might be desired, it is probable the gain would be sufficient to more than pay interest upon any expenditure for apparatus installed.

I have understood that Mr. J. Parke Channing has been experimenting at Ducktown with the object of doing away entirely, or nearly so, with the use of carbonaceous fuel, and that he has met with very considerable success. His experiments may have included the use of hot blast. Perhaps Mr. Channing will favor your readers with his results? They would certainly be of very great interest in the consideration of this subject.

I have been informed of one plant where the use of hot blast has reduced the coke consumption about 25 per cent. A part of the charge consisted of roasted ore, and when raw ore is substituted for this it is expected the coke consumption will be still further reduced. I hope to be able soon to give detailed information as to the results at this plant.

In the latter part of his article Mr. Godshall goes into the relative economy of the different methods of treating ores, and mentions that Messrs. Carpenter and Lang both advocate the direct smelting, without concentration, of the Butte ores. When one hears of the very low smelting costs which are said to prevail at some of the Montana plants the question very naturally arises whether or not the present methods could be advantageously changed. The costs of smelting in recent years have certainly been very materially reduced. Years ago the costs of, and the losses in, concentration were considerable, and if the costs and losses of those days are being figured against the low smelting costs of to-day, the advantage, assuming a favorable smelting mixture, would possibly be with straight smelting. But it is possible, and probable, that the costs and losses in concentrating have likewise been very much decreased, thus lessening any advantage straight smelting might seem to have. Furthermore, the concentrating ores contain such a percentage of silica that a large tonnage of expensive flux would be required, and the amount of first class ore going into the charge would not greatly alter the composition percentages. It therefore seems unlikely that straight smelting would prove to be any economy over the method in vogue. It has occured to me, however, that possibly a larger tonnage of the low-grade ores is being concentrated than is absolutely necessary for a desirable smelting charge, but only those who have all the facts which would have to be taken into consideration can determine this.

Mr. Godshall suggests that instead of attempting straight smelting, "it would be better to first demonstrate the advantage, if there be any, of smelting the present Butte charge raw or without any previous roasting." I do not recall that roasted concentrates go to the blast furnace. The expense of briquetting the fine concentrates satisfactorily is so great that they are preferably roasted and treated in the reverberatory furnaces with comparatively slight losses in flue-dust. I think in the present practice the blast furnace charge is 'raw' and probably the only changes which can be looked forward to will be the utilization of the heat value of the sulphur in this charge, if the sulphur contents will permit, and the use of a heated blast.

P. Wiseman.

Los Angeles, Cal., Feb. 12, 1904.

SULPHURIC ACID IN RUSSIA.—Being the largest producer of petroleum in the world, Russia's consumption of sulphuric acid is enormous. By far the greater part of this acid is either imported or made from Scandinavian pyrite, in the vicinity of St. Petersburg. A small quantity of acid is also recovered as a by-product from zinc ores in Poland. Comparatively little native sulphur, found at various places, is consumed, although last year the imports from Sicily totaled 15,068 tons.

IRON ORE PRODUCTION IN 1902.

The report on iron ore production in the United States in 1902, prepared by Mr. John Birkinbine for the Geological Survey, is issued some months later than usual. It gives the total production for the year as follows, in long tons:

	Tons.	Per cent.
Red hematite	30,532,149	85.9
Brown hematite	3,305,484	9.3
Magnetite	1,688,860	4.7
Carbonate	27,642	0.1
Total	35,554,135	100.0

The red hematite was the most important variety of ore mined. Minnesota was the most important contributor of this class of ore, followed by Michigan and Alabama. The brown hematite is next in importance. Alabama was the principal contributor, followed by Virginia and West Virginia and Tennessee.

Magnetic and carbonate ores showed decreases in output. Of magnetic ore, Pennsylvania continued to be the principal producer, followed by New York and New Jersey. Nearly all of the carbonate ore was mined in Ohio, a small amount being supplied by Maryland.

In addition to the iron ore mined, 65,246 long tons of zinc residuum were used as iron ore in 1902. The amount of 'blue billy' or ore from iron pyrites used in the manufacture of sulphuric acid, is not stated. In 1902 192,285 long tons of concentrated ore were produced, this being included in the above table. In addition to the magnetically concentrated ore a considerable amount of magnetically cobbed ore was obtained in New Jersey, this method being adopted in place of sorting in the mine.

NEW COKE-OVEN BY-PRODUCT INDUSTRY.—Something like 20,000 bbl. tar will be produced annually as a by-product of the Zenith coke ovens, at Duluth, Minn. To utilize this product the Duluth Tar Company has been organized, which, when its works are erected some months hence, will manufacture various articles, principally tar paper.

TIN IN BOLIVIA.—In our issue of February 4, page 244, we published a statement of tin production in Bolivia. Our special correspondent now informs us that, in addition to the mines then noted, the Totoral Mining Company made, in 1903, a total output of 866 tons of *barilla*, or tin concentrates. The average tenor being 66 per cent, this was equivalent to 571.6 tons metallic tin.

A NEW METHOD FOR INCREASING THE DENSITY OF STEEL INGOTS.—The principle of this method (*Stahl und Eisen*, November 1, 1903) is to allow for the escape of occluded gases in the metal by keeping the upper part of the ingot in a fluid condition until the mass of the ingot has solidified. To accomplish this, a burner cap is placed on the top of the ingot mould and a gas blast flame is directed downward upon the metal; vent-holes at the sides of the cap allow the gases to escape. The flame is so proportioned as to keep the upper part of the ingot considerably above the melting-point, thereby causing the ingot to solidify progressively upward. The metal can thus follow the contraction in volume and the gases are free to escape.

MINING AND BUSINESS INTERESTS IN KOREA

By S. HERBERT WILLIAMS.

With an area equal to that of Kansas, with a recorded annual export of gold amounting to $2,500,0000, the greater part of which is the output of two foreign concessions granted within six years; possessing excellent agricultural lands, a very considerable forest reserve, a good climate, and an increasing market for modern products, Korea to-day occupies an economic as well as a strategic position.

Although mining will form an important factor in the future of Korea, it must not be forgotten that agriculture is the foundation of the little empire which—while providing for home consumption—exports rice and beans to the value of $2,500,000 per annum and hides valued at $260,748, the total value of exports being $3,629,000. The above figures represent an average for five years. Korea offers an increasing market for cotton goods, yarns, oils, railway plant, mining machinery and mining supplies. The total imports per annum are valued at $6,020,028, these figures also being an average for five years.

The known gold mines and alluvial deposits of the region offer no marked distinction to those found in other parts of the world and, as in other mining districts, the industry has undergone periods of activity and depression; mines have been opened and closed, to be re-opened later on by those who wished to try their fortune; other mines have been worked to a point where the natives were unable to handle the water, while operations have ceased in some cases by reason of those numerous causes incidental to mining, such as expiration of lease—all mines being the property of the crown—low-grade ore and metallurgical difficulties. Gold is produced from two sources, vein and alluvium, the former offering difficulties which the native cannot overcome with his tools. Since foreign companies have been operating in Korea the outside miners have been supplied with material stolen from the foreign concessions, the native company having a fixed price for a foot of fuse, a stick of gelignite and stated prices for drills. This encouraged the native to steal. Rigorous measures to prevent this theft by searching the miners on leaving work were successful.

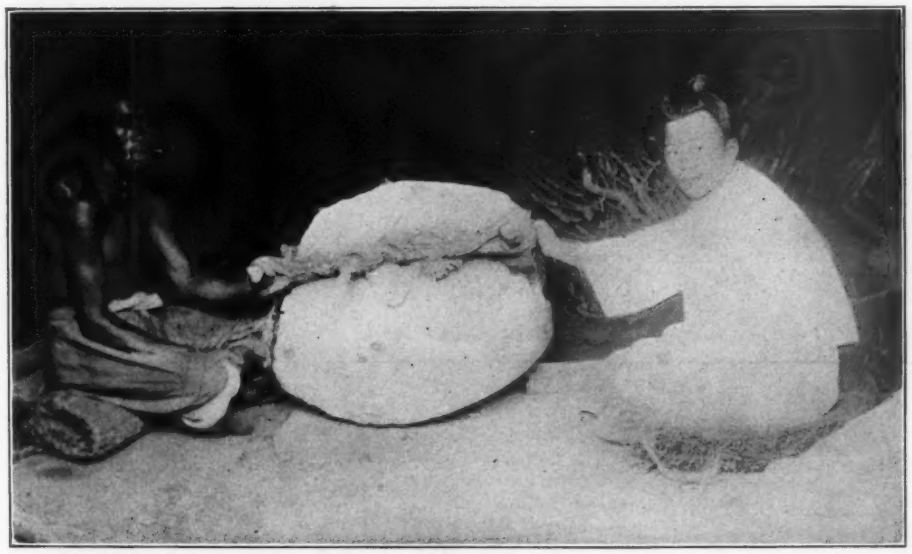

FIG. 2.—GRINDING GOLD ORE.

The principal difficulty in vein mining is the pumping of water. In mines having a sloping entry they employ a means of draining their mines which in its way is admirable, although, perhaps, it is more spectacular than efficient. In Fig. 1 coolies are emptying an alluvial pit; but in this case there is only one lift. In an incline shaft, for instance, several sets of these men would raise the water from one to the other, the water being caught in dams between each set of operators. It will be seen from the photograph that the water is raised by dipping the buckets in the lower dam and swinging them to the upper.

In the absence of steel tools and explosives, the breaking of rock is necessarily slow. One of the methods employed is to build large fires in the different faces and cool them suddenly with water; the effect of this is that, while an amount of ore is loosened, the enclosing walls are also disintegrated, resulting in the handling of five tons of rock for one ton of ore and rendering the hanging wall exceedingly dangerous.

The ore is crushed between two stones, the upper one having its bottom cut in the form of an arc as will be seen in Fig. 2. This is rocked to and fro on a flat granite boulder, producing a pulp equivalent to a 30-mesh screen. After washing, the coarse pulp is sometimes re-ground between two smaller rocks, as illustrated in Fig. 3.

FIG. 1.—DRAINING THE WORKS.

Illustrations of Korean mining would not be complete without Fig. 4, in which coolies are seen washing the pulp. The pan or dish is made of wood 6 in. deep and 2 ft. diameter. The quantity taken varies from 10 to 15 lb. at one wash. They are adept in the use of this dish, and one cannot help noticing the flippancy with which they handle the product, receiving, as they do, a pittance for their labor.

Alluvial mining is followed by a large number of natives, but no authentic estimate is obtainable of the amount of gold recovered. It finds its way through different channels to the Japanese gold buyers, some of whom are purchasing for banks, others acting for themselves. The gold is made up into packets of one *yang* each, a *yang* being equal to 1.223 oz. troy. The method employed is to clear what the Australians call a 'paddock,' varying in size from 50 ft. to 100 ft. sq., and remove some distance from the pit 15 ft. of overburden; the wash is found next to the bed-rock from 18 in. to 3 ft. 6 in. thick (See Fig. 5). The wash is usually carried to the nearest stream in a basket-like receptacle made of millet stalks carried by coolies on their back in a frame suspended from their shoulders, as in Fig. 6. Note the 'boss' on the bank.

All things being considered, it is doubtful if the alluvial deposits could be turned to better account by using western methods. Although cheap labor is available in plenty, it is necessary to employ European or American supervision; the main drawbacks are removal of overburden, lack of fall (1 ft. in 1,000 ft.), limited extent of deposits (the section in Fig. 5 may be considered rich) and a great quantity of bed-rock water to handle. Alluvial mining extends over a large portion of the country, and is usually undertaken by a small syndicate of merchants who furnish the coolies with shoes, shelter and food, and a portion of the recovered gold, generally one-

third. The coolies are, therefore, interested parties, and the operations are based upon mutual risk. While there are gravel patches that are payable, a great deal of ground is turned over without profitable results, and it

FIG. 3.—GRINDING GOLD ORE.

is certainly regrettable to see fertile valleys destroyed forever by a class of transient coolies who roam over the country ruining farms on which families have lived for generations.

Steam power—when using coal—is the most expensive consideration in Korean mining, the coal being imported from Japan, but it is possible that Korea may supply her own demands by giving foreigners an opportunity to develop the seams known to exist at tidewater.

The Korean railroad system extends for 28 miles, running between Seoul, the capital, and Chemulpo, the most important seaport. The rolling stock was made in the United States, and the road was built by Americans. It is now absorbed by the Seoul-Fusan Railroad Company, which is building a road from Fusan in the south to the capital. On reference to a map of Korea it will be seen that the natural extension of this road will be to Ping-Yang, and then to Wiju on the Yalu river, all on Korean soil.

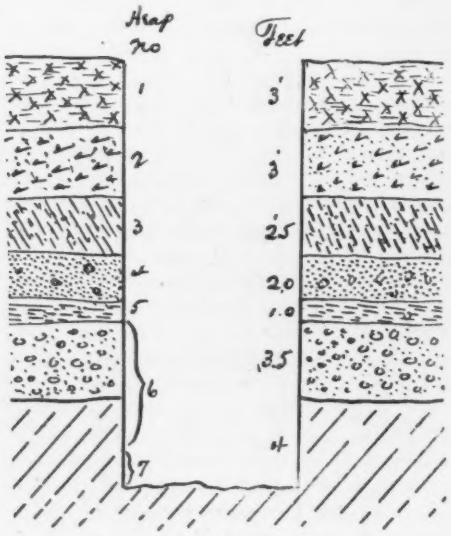

FIG. 5.—SECTION OF TEST-PIT.

Tests from No. 1 Pit, 8 by 4 feet.

Heap No.	Description.	Thickness, Ft.	Cu. Yd.	Wt. Gold Dwt.	Wt. Gold Gr.	Grains, Per Cu. Yd.	Value, Per Cu. Yd.
1.	Black soil	3.0	3.55	..	..	..	....
2.	2 ft. yellow clay and 1 ft. black	3.0	3.55	0	6.7	1.9	$0.076
3.	Green clay	2.5	2.96	5	9.0	43.8	1.752
4.	Green clay with yellow streak	2.0	2.04	0	9.7	4.7	0.188
5.	Green clay	1.0	1.18	0	3.0	2.5	0.100
6.	Alluvial proper	3.5	4.15	12	7.0	71.0	2.840
7.	Apparently bed-rock	4.0	4.74	0	19.5	4.0	0.160
	Total	19.0	22.17	19	6.9	..	....

Ping Yang is one of the most important cities in Korea. It is situated on the Tai-Tong river—which is navigable to within five miles of the city by coastal boats—and is situated in the center of the mining districts and on the main road from Seoul to Pekin; the population is estimated to be between 50,000 and 100,000. Ping Yang is the commercial center for a large district; most of the business sites are already in the hands of the Japanese, who are the bees in the commercial hive of the country, and the Dai Ichi Genko has already purchased a site for the extension of its banking system.

Wiju—having been declared an open port—must increase in importance. It is on the trade route of upper or northern Korea, and with the establishment of foreign firms and consuls, its value as a business center will be recognized. The Seoul-Wiju railroad concession has not yet been granted, and it is therefore in order for some enterprising railroad capitalist to apply for the concession to build and operate a road which at some time will connect with the Trans-Siberian system and form the principal outlet of the East.

Opportunities for the investment of capital—apart from mining, which will soon account for an annual output of gold amounting to $3,500,000—seem to present themselves on every hand, but the government successfully evades the granting of concessions of any kind by playing one nation against another, until the city of Seoul has been transformed from the seat of government to a vortex of intrigue. Agents of influential Japanese companies and individuals are found everywhere. Count Shebusawa, the financial magnate of Japan, is ably represented. He is interested in the Seoul-Fusan railroad, and is president of the Dai Ichi Genko (the first bank), which has established branches in every prominent town. This same bank has installed a gold-buying department in its Seoul bank, with an assay office which would do credit to a much larger institution. The notes of this bank caused a great deal of trouble recently, because of the opposition offered to their issuance by Korean officials, but further trouble was averted by the Korean government withdrawing the notice of prohibition. The notes

FIG. 8.—PANNING GRAVEL AT A SLUICE.

are made payable to bearer in Korea, and are redeemed with, and backed by, Japanese currency; so it is stated. In the principal business centers these notes are accepted and form the circulating medium, but in the country districts, they are refused, where silver and even spurious nickels are accepted in their stead, a fact which proves that confidence is a crea-

FIG. 6.—REMOVING GRAVEL FROM OPEN CUT.

ture of slow growth. Whatever may be said against them, the notes certainly prove acceptable to business men who find a fluctuating silver currency anything but satisfactory. The Dai Ichi Genko promises to withdraw these notes on the establishment of a Korean bank, but it is evident that when they gain a wide circulation, these notes will be as difficult to replace as the existing system. The most progressive Koreans desire a Korean currency with a Korean national bank issuing its own notes, but lack of cash, want of confidence even among those who could furnish the capital and Japanese opposition are responsible for its non-existence. The high rates of interest charged by foreign banks in the East (7 to 8 per cent), and the probability of a profitable exchange business, might well offer inducements to American bankers who should not lose sight of the ever increasing shipping tonnage and exports leaving the Pacific coast.

Should Korea, in spite of intrigue and a desire to acquire the country by the nations now at war, maintain her independence, a more liberal policy may be expected from the Korean government than that hitherto pursued, and the gradual disappearance of the exclusiveness and antipathy which permeate all official circles as well as the ignorant classes. If Korea would invite foreign capital instead of opposing it, and discontinue the 'squeeze' system—where one official extorts money from his inferior, a system which is recognized from the village headman to the ministers of high rank—making the poor poorer, and killing whatever ambition the native has to acquire wealth, the empire would change from a "hermit nation" to an industrial hive, and no one would reap a greater benefit than the native people who now live from hand to mouth as the victims of usurious money lenders.

A METHOD FOR THE DIRECT DETERMINATION OF ALUMINA.

By CHAS. E. RUEGER.

Before entering upon a description of the method itself, it may be well to make certain comments upon some of the methods generally in use, as well as certain recent data upon the accuracy of such methods.

In considering the merits of any chemical method, it is well to bear in mind that it may serve particular purposes very satisfactorily, while not adapted to others. In other words, a method may derive merit and value by reason of its suitability to a large field of material of frequent occurrence in the arts and manufactures. An instance of this nature is the cyanide copper method, so extensively used at present, although considered of very limited application and accuracy by Fresenius and Liebig. For scientific purposes where high accuray is the great consideration, time being of minor import, the method herein presents probably no advantages over what already exists. But it is believed to fulfill the requirements of practice, more especially metallurgical practice, in which time is of the very essence and fair accuracy ample. From this latter aspect, solely, was this investigation undertaken and is the scheme herein advocated.

The method generally in use is the determination of alumina by difference. Obviously, this presupposes the accurate determination of every other substance present in the combined oxides which are weighed, or else their satisfactory elimination.

Dr. Hillebrand has pointed out the sources of error in this method in cases of refined analysis. But whatever accuracy can be obtained by chemists possessed of the unusual skill of Dr. Hillebrand, and under unusually refined conditions of analysis, the fact remains that in most laboratories the chemists have not the opportunities, even though possessed of the skill, to achieve results which can be considered accurate. One would infer that the method of determining alumina by difference, in the hands of the average chemist, would reach its highest accuracy in cases where only a small amount of iron is present, associated with elements easily eliminated. Let us now turn to some data of this nature. The results of a co-operative analysis of a Portland cement and slurry, recently published by the New York Section of the Society of Chemical Industry, present such a case. According to the report of Dr. Hillebrand, the sample analyzed contained 1.64 and 1 per cent of iron and 5.98 and 3.5 per cent of alumina, respectively, in the presence of silica, lime and magnesia. Yet the results reported by the co-operators on the cement varied from 4.88 to 6.67 per cent alumina, a difference of 1.79 per cent. On the slurry the results varied from

FIG. 7.—KOREAN DRILLING MATCH.

2.36 to 4.13 alumina, a difference of 1.77 per cent. The chemists are stated to have used the method by difference, and the inference is that they exercised more than ordinary care, knowing that the results would be compared and published. Turning now to a more com-

plex material. There was published in Vol. LXXV, page 295, of the ENGINEERING AND MINING JOURNAL, by Thorn Smith, the results of a co-operative analysis of a copper slag. Here we have a material containing 4.07 alumina, in the presence of over 30 per cent of iron, with silica, zinc, manganese, lime and magnesia; consequently presenting a much more difficult case for analysis than the preceeding. The co-operators are reported to have used the method by difference and the inference also is that they exercised more than ordinary care. The results vary from 3.24 to 7.16 per cent alumina, a difference of 3.92 per cent. Of the 23 reporting, six have good results, that is within 0.3 per cent of the standard made by Dr. Hillebrand. Considering that most of the co-operators are well known as competent chemists, and that the material is not an unusual one for a metallurgical laboratory, the conclusion must be drawn that a more certain method is wanted in the average laboratory, than that of alumina by difference. To get even fair results on such a copper slag, it is essential that a double basic acetate precipitation, or an ammonia and basic acetate precipitation, be made to eliminate all of the zinc and manganese; that the reagents and water used be pure; that the final oxides of iron and alumina be fused with bisulphate of potash, the melt dissolved in water and sulphuric acid, evaporated to fumes of sulphuric anhydride, and the residual silica deducted. The silica so obtained may be considerable. This is especially the case where only one evaporation is made to dehydrate the silica, and where the temperature of dehydration is low. Then also, silica may come from solvent action upon the glassware, as well as from dust in the laboratory and in the reagents. All this means then that the accurate determination of alumina by difference, in the case of such or similar material, is one not only requiring considerable care, but an expenditure of time not tolerated by the average employer. Yet without these precautions, no determination of alumina by difference can be considered as even of approximate value where the composition of the material is unknown. It is the custom in some laboratories, even in case of complex mixtures, to take the filtrate from the silica without previous passage of hydrogen sulphide, and at once make a double ammonia precipitation of the iron and alumina. The precipitate so obtained, if at all considerable, will of course contain all the lead, bismuth, arsenic and antimony, and a portion of the copper, zinc, and manganese, if present in solution, as well as the contaminations previously commented upon.

Another method consists in taking advantage of the solubility of alumina in potassium hydrate. The objections urged against this method are that the caustic alkali generally contains alumina and that its solvent action upon the glassware is great, thus introducing silica into solution which will contaminate the subsequent alumina precipitate. Another source of silica, not generally mentioned, is in the caustic alkali itself. A recent sample from one of the best known makers, contained sufficient silica to utterly vitiate any results.

Wöhler, in the middle of the last century, precipitated alumina by taking advantage of the fact that sulphur dioxide will precipitate alumina from a slightly acid solution. His scheme consisted in nearly neutralizing the free acid, adding thiosulphate of soda and boiling. The reaction may be stated as:

$$Al_2Cl_6 + 3\ Na_2S_2O_3 + 3\ H_2O = Al_2(HO)_6 + 6\ NaCl + 3S + 3\ SO_2.$$

Few of the modern books on chemistry contain any reference whatsoever to this method. One concludes, therefore, that the method was either intrinsically unsatisfactory, or else that no one ascertained the exact conditions requisite for accurate results. Years ago I experimented with the original Wöhler method and failed to achieve consistent results. It occurred to me that advantage could be taken of this reaction, and by modifying the scheme a method could be evolved which would have a wide application. The field sought to be covered is that large mass of metallurgical material in which iron is present in considerable quantity associated with copper, lead, zinc, manganese, nickel, lime and magnesia. It is also believed that a direct precipitation of the alumina is more desirable than an indirect method, since it permits the chemist to judge from the physical characteristics of his precipitate, whether or not the operations have been properly performed. Sulphite of soda was substituted for the thiosulphate, and seemed an improvement. The exact conditions under which precipitation takes place were established. The method is as follows:

Hydrogen sulphide is passed through the filtrate from the silica. The precipitated sulphides are filtered off and washed. The filtrate is boiled to expel H_2S, and the iron therein oxidized to the ferric state with nitric acid or chlorate of potash. The iron and alumina are then precipitated by a single precipitation with ammonia and ammonium chloride. The hydroxides thus obtained are thoroughly washed, and then dissolved with as little hot dilute HCl as will accomplish solution. The resulting solution should not be more than lukewarm, which can be quickly done by diluting with some cold water. Carbonate of soda is now gradually added to nearly neutralize the free acid. Ammonia has not proved a satisfactory reagent for this neutralization. If considerable iron is present, the color of the solution will be a good index; in this case stop when the solution turns a slight brown. To the perfectly clear solution add now 10 grammes of sulphite of soda and dissolve same by stirring. Mallinckrodt's powdered, anhydrous sulphite of soda has been found free from alumina, and by reason of its finely divided condition dissolves with rapidity, thus saving time. When the sulphite is completely dissolved, a permanent precipitate should appear; if not, add more sulphite. Now very carefully dissolve this precipitate with HCl until the solution just clears; one or two drops in excess doing no harm. The solution should now emit a faint odor of sulphur dioxide. Cover with watch glass, and heat rapidly to boiling. As the temperature increases, the red color of ferric iron should rapidly disappear, and bubbles of sulphurous oxide should rise through the solution with increasing vigor. If this does not happen, the solution is probably not sufficiently acid; therefore add a few drops of HCl. Generally when the solution reaches boiling, or soon thereafter, the alumina will commence to precipitate. Vigorous boiling is now continued until not the slightest odor of sulphur dioxide can be detected. Ten minutes' boiling is generally sufficient. The solution is now set aside and the precipitate allowed to settle, which will occur quickly. The beaker must be kept covered. The precipitate is compact, granular and filters easily; in fact, a filter pump can be used to advantage without clogging the filter. Upon filtering, the filtrate will turn brown, due to oxidation of the iron in solution. Pay no attention to this. Wash three times with hot water. The alumina will still contain a little iron which is eliminated by repeating the operation. For this purpose the precipitate is dissolved in the least quantity of hot dilute HCl. If alumina, it will do so readily, forming a clear solution. Neutralization with carbonate of soda and precipitation with sulphite of soda are repeated in the manner already described. The second precipitate will be practically free from iron. Ignite in the muffle at a high temperature and cool in the desiccator. It is weighed as Al_2O_3. The ignited precipitate should be perfectly white, with possibly a faint bluish tinge; this will be the case if the operations have been properly performed. Aluminum hydroxide being soluble in sulphurous acid, this gas must be completely expelled before the precipitation can be considered complete. More free HCl than indicated must also be avoided. Only after some familiarity with the process, and the exercise of care, can satisfactory results be obtained. For this reason I have described the procedure with a minuteness, which, in the eyes of some, may appear inexcusable prolixity. When once familiar, however, the scheme is very simple, rapid and certain.

Titanium and phosphorus vitiate results; they being, of course, precipitated with alumina. Since, however, titanium and phosphorus are rare, or present in quantity which can be ignored, the method is adapted to the field of material usually found in a metallurgical laboratory.

The following data of results obtained will give some idea of the limitations of this method. In order to ascertain how completely the precipitation takes place under the conditions stated, three direct experiments were made with only alumina in solution. They gave 99.46, 100.11, 99.73 per cent instead of 100.

Alumina in the presence of considerable iron gave:

Fe,	Taken, Al_2O_3,	Found, Al_2O_3,	Error,
Grams.	Grams.	Grams.	Grams.
0.420	0.0093	0.0104	+0.0011
0.300	0.0145	0.0151	+0.0006
0.300	0.0172	0.0173	+0.0001
0.300	0.0291	0.0306	+0.0015
0.300	0.0355	0.0371	+0.0016
0.300	0.0460	0.0460	0.0000
0.300	0.0763	0.0741	—0.0022
0.300	0.0761	0.0759	—0.0002
0.300	0.0761	0.0770	+0.0009
0.300	0.1035	0.1015	—0.0020
0.300	0.1438	0.1432	—0.0006
0.300	0.1902	0.1876	—0.0026

The plus errors in the foregoing figures seem to be due to dust in a batch of sulphite of soda used at the time. Fusions with bisulphate of potash showed that the impurity was silica and not iron. Only unweighable traces of iron were found to contaminate the precipitates. The above figures are, however, given without corrections, in order to indicate the limit of accuracy under ordinary conditions of analysis.

Zinc, manganese, and nickel are present in many metallurgical materials. A portion of these would contaminate the precipitated hydroxides of ammonia and ammoninum chloride. The following will indicate their influence on the process:

Zinc.	Taken—Grams, Fe.	Taken—Grams, Al_2O_3.	Found, Grams, Al_2O_3.	Error, Grams.
0.100	0.300	0.0677	0.0693	+0.0016
Mn. 0.100	0.300	0.0540	0.0551	+0.0011
Ni. 0.100	0.300	0.0528	0.0542	+0.0014

The plus results in these are believed to be due to dust in the sulphite. Zinc, manganese and nickel seem to be without influence on the precipitation.

Experiments on the effect of other elements usually found in ores, showed that lead, arsenic and antimony interfere and consequently must be removed before making the precipitation with ammonia. Copper does not affect the result.

Assuming that one gram of material is taken for analysis, the figures given indicate that good alumina results can be obtained by this method, that is, within 0.3 per cent or better. And this without refinements in analysis, but with ordinary laboratory conditions and with ordinary care.

TURBINE AIR-COMPRESSORS.

The principle on which the Parsons turbine acts when used as an air-compressor, says the *Scientific American*, is similar to that of the ordinary revolving disk fan, in which the velocity and volume of the current depend upon the size and angle of the vanes and their speed. If such a fan were placed inside a pipe approximately equal to its own diameter, and if there were no slippage between the air and the fan, the quantity of air moved per minute would be the product of the fan area, the pitch of its blades, and the number of revolutions per minute, from which data the velocity of the air-current can also be computed. The pressure against which such a fan may work is proportional to the square of the maximum velocity. Owing to the inevitable slippage, however, the volume and velocity of the air-current, calculated theoretically, must be multiplied by a coefficient which will depend upon the size, number and pitch of the vanes and the speed at which they are run. There is not yet any experimental data to determine what this coefficient may be for the Parsons turbine compressor, and the conditions are so widely different from those of ordinary fan practice that it is worthless to conjecture what it may be. The effect of the several rows of blades on the Parsons turbine, if the different rows are all set at the same angle, would be to reduce the slippage, and thus make possible the use of a very much higher pitch, producing a correspondingly higher velocity and pressure of air than would otherwise be feasible.

PETROLEUM COKE.—The *Journal du Pétrole* reports that Professor A. P. Lidoff has invented a new combustible by pushing the decomposition of tar oils to the extreme limit, by which he has succeeded in obtaining a hard coke of superior quality. Thus treated, the raw petroleum of Grosny gives 5 per cent of gas and loss, 85 per cent of liquid hydrocarbons of different sorts, and 10 to 11 per cent of solid hard coke. Of course, a determined temperature is necessary, and this the professor puts at from 400° to 420° C. In putting the price of the petroleum at 6 rubles the 100 poods, products of the value of 10.50 rubles are obtained. The cost of the operation, it is claimed, will not be considerable.

THE POWER PLANT OF THE MOCTEZUMA COPPER COMPANY.*

By JOHN LANGTON.

In determining what kind of power should be adopted for the works of the Moctezuma Copper Company, at Nacozari, Mexico, certain considerations imposed by local conditions of water-supply, fuel and transport had to be taken into account.

During most of the year, the water-supply is abundant for all purposes, but dwindles rapidly when the dry season sets in, reaching a minimum flow which is entirely underground. It was evident, that, with the greatest care in keeping down the unavoidable loss of water in milling and smelting, these operations and hence the capacity of the works would be ultimately limited for some two months of the year by the water-supply available at this period of minimum flow.

The nearest railway terminus was in Arizona, at the international boundary-line; and the price of supplies at that point would be enhanced at Nacozari by the additional cost of a 90-mile wagon-haul. During the rainy season, transport to Nacozari was much impeded, and at times made impossible, by the conditions of the roads. Hence, to insure continuous operation at the works, it would be necessary to provide for hauling the year's supplies, including fuel for power and coke for smelting, in less than 11 months. In other words, the average freight delivered daily at the works should be at least 10 per cent more than the average daily consumption.

The country surrounding Nacozari, being sparsely wooded, mainly with scrub white oak, offered a source of fuel-supply of considerable extent, though of poor quality. For equal heat-values, wood at Nacozari cost at that time much less than coal; but it was decided that a sufficient quantity of wood-fuel for steam-power was not available, and that a large proportion of coal would still be needed for boiler-fuel.

After 18 months' operation, the cost and difficulties of transport were materially reduced by the construction of the Nacozari Railroad to Cos, 22 miles from Nacozari. Its extension to Nacozari, which is now under contemplation, will further reduce the freights on coal. Meanwhile, the cost of gathering wood has increased with the exhaustion of the supply in the immediate vicinity; so that, when the railroad is completed to Nacozari, the two fuels will cost approximately the same for equal heat-values.

The total power contemplated to begin with was from 500 to 600 h. p., of which the concentrator, the converter blowing-engine and the furnace-blower would be the principal consumers. Compound condensing steam-engines of moderate power would be the highest grade of steam-apparatus appropriate to the size and location of the plant. And, including shrinkage, 3 lb. coal per brake horse-power-hour would be a good result from such a plant. In comparison with this result, 1.5 lb. coal per brake-h.p.-hour was obtainable with gas-engines using producer-gas. Moreover, besides the greatly reduced fuel-cost, gas-power offered very important additional advantages in facilitating the continuous operation of the works at their full capacity: by cutting down the water-consumption in the dry season; by reducing largely the stock of fuel needed to tide over periods of interrupted transport, and by reducing the average quantity of daily freight.

On consideration of the whole question, with due weight given to the facts briefly indicated above, it was decided that properly selected gas-engines, in a suitably arranged power plant, would be well adapted to the general conditions at Nacozari, and would give a fuel-economy which was there particularly valuable, in view of the limited local supply of wood and the then necessarily high price of coal.

The power-house contains eight single-cylinder Crossley gas-engines, 18.5 in. diameter by 24-in. stroke, running at 200 revolutions per minute. These engines are of the four-cycle type, with 'hit and miss' governor. Each engine is direct belted to a 65-k. w. direct-current generator. The generators are run in parallel, and deliver to the main switchboard in the power-house, from which the current is distributed at 250 volts to some 40 different motors scattered about the works, ranging in size from 5 to 175 h. p. Arc and incandescent lights are operated from the same circuit as the motors.

The engines are started by compressed air, a method which has been found very simple and convenient. The cock controlling the admission of compressed air to the engine cylinder is worked by hand. Frequently but one impulse with compressed air is needed, and seldom more than three.

One air-reservoir of 90 cu. ft. capacity is used, which is kept full of air at about 90 lb. pressure by the intermittent use of a motor-driven air-ocmpressor, of 8 in. diameter by 6 in. stroke, running at about 60 revolutions per minute. A steam-driven locomotive air-pump was used in starting up the plant, and, supplied by the gas-plant boiler, it remains as a stand-by to the compressor.

Opposite each engine is a tank 11 ft. by 18 ft. by 3 ft. deep, which is placed outside of the power-house on a level 20 ft. above the engine. Pipes from the inlet and outlet of the engine water-jacket are connected to the bottom of the tank; and the heat of the cylinder automatically keeps the jacket-water in circulation. The flat form of tank gives sufficient surface to cool the water by radiation and evaporation.

The water at Nacozari is very hard, and the formation of scale in the water-jackets of the engines caused some trouble at first. The water needed to make up for evaporation is now purified by treatment with soda. It flows from the mixing-tank to a deep conical-bottom tank, of the type used in the mill for thickening pulp. The sludge of lime and magnesia precipitates escapes at the bottom outlet, while the clarified water, overflowing the rim, passes to the jacket-water tanks.

The main bearings of the engines are oiled continuously by an automatic oil-circulating and filtering system. Two men on shift are required for attendance, an engineer and a helper.

The gas-producers are those of the Loomis-Pettibone Gas Machinery Company. The draft through the producers is created by the suction of the gas-exhauster, and air enters through the open feed-doors in the top of the producers. Through the same doors the fuel is charged by hand. The air thus

*Abstract of a paper read before the American Institute of Mining Engineers, October, 1903.

comes into contact first with the fresh fuel, and the products of combustion, together with any distillates from the fresh fuel, are drawn downwards through the deep charge of incandescent fuel and out through the fire-brick grate at the bottom of the producer. The high temperature of the gas drawn out of the producer is partially utilized to generate steam in the boiler, through which the gas next passes, and from which it emerges cooled to about the ordinary temperature of chimney gases. It is further cooled to about atmospheric temperature in passing through the water-sprayed coke-filled trays of the scrubber, from which it finally reaches the exhauster which delivers it into the holders.

The quantity of gas made is controlled by the speed of the exhauster, which is of the positive type. The vacuum on the suction side of the exhauster, required to produce the necessary draught, depends upon the condition of the fires and the quantity of gas being made, but ordinarily it is from 12 to 24 in. of water. The exhauster delivers against the 6 in. of water-pressure to which the gas holders are weighted. The total difference of pressure, therefore, is from 11 to 18 ounces.

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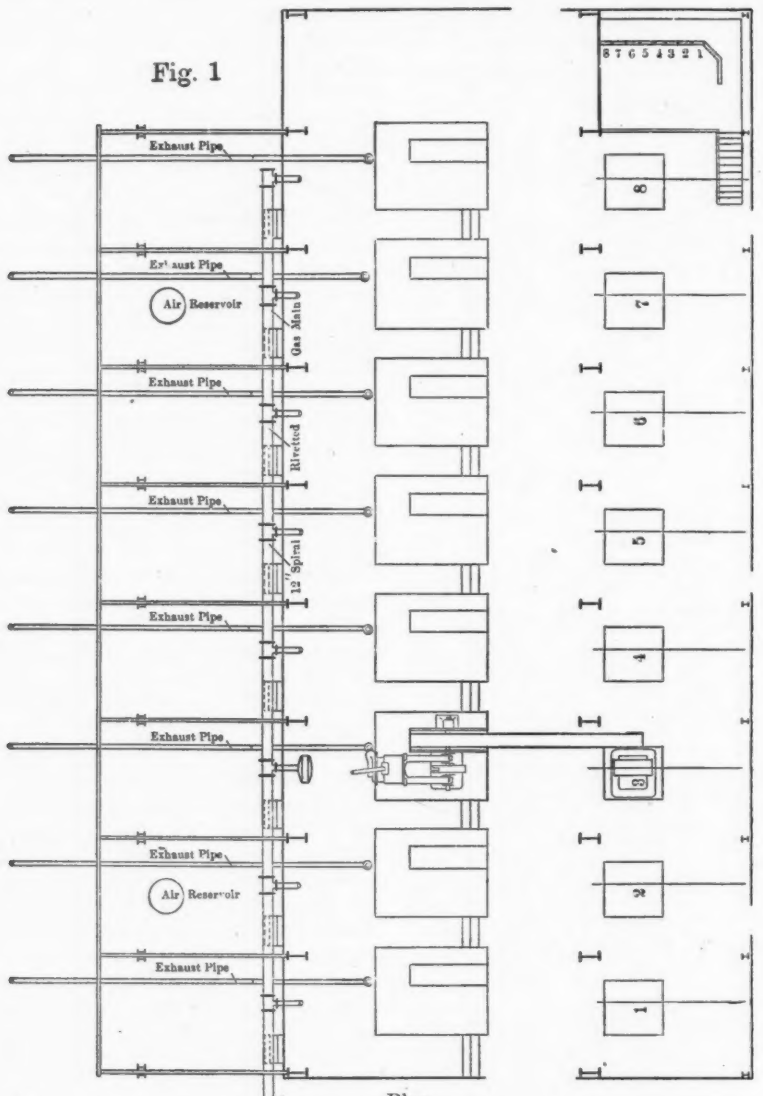

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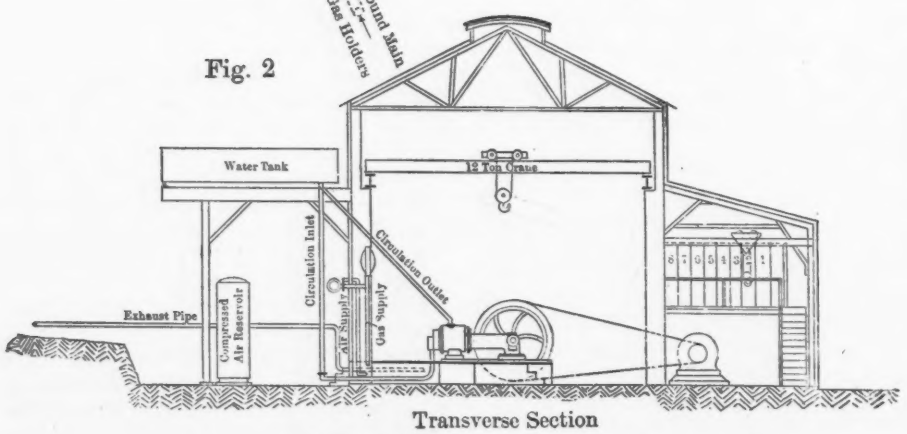

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The power required to drive the pump and the exhauster in the gas-house is furnished by an electric motor. In case the whole plant is shut down, the holder is left full of gas, which gives sufficient power to start the gas-plant and to run it until it is again producing gas. A small steam-engine was used to start the plant first, when there was no gas in the holder, and remains in reserve for a similar emergency.

The plant has been operated with wood and with coal, both anthracite and bituminous. The down-draught principle of the producers, by which all gases pass out through the bottom of the fire, has proved thoroughly efficacious in producing fixed gases from all kinds of fuel used at Nacozari. The water from the scrubber rarely shows even that trace of tar which manifests itself by an iridescent film on the surface of the water in the lower scrubber tank.

The use of producer gas made from wood alone is the most novel feature of the plant. No guiding experience was found for this process; but, with the desire to utilize as far as possible the limited local wood-supply, the gas-producer plant was selected with the object, among other things, of determining the advisability of using, if not wood alone, at least a considerable admixture of wood with bituminous coal. The most obvious difficulty to be feared arose from the large proportion of condensible distillates yielded by wood, and the danger that some portion of these might be imperfectly fixed in passing through the producer. The trouble from tar deposited in the gas apparatus and pipes would be serious, and even a small quantity of tar in the gas itself is a fertile source of trouble at the engine valves. Unless a permanent gas could be made from wood, this fuel would be unavailable.

The first care, therefore, was to insure that there should be a bed of charcoal on the grate sufficient to form an adequate fixing-zone. To obtain this the producers were filled about 5 ft. deep with cordwood sawn in blocks about 6 in. long, and the contents blown with a slow fire for four or five hours before the gas was turned into the holder. The gas, as it proved, was turned into the holder too soon. At first, it contained some tar; and it was not until after three hours' operation that the charcoal accumulated in sufficient quantity, so that the producers delivered fixed permanent gases to the holder.

The character of the gas produced from different fuels is shown by the following averages from a series of analyses made by A. Sandberg, of Lund, during the final trials of the gas-making plant, which extended from February 16 to March 20, 1901.

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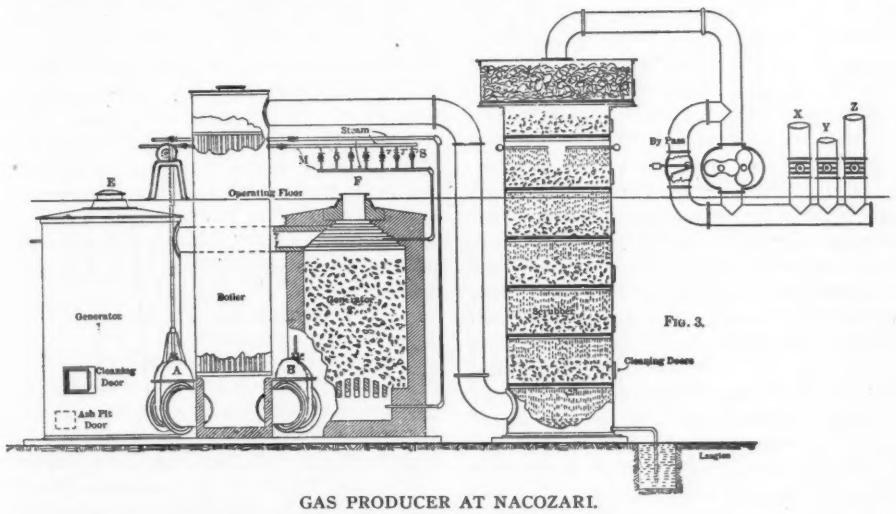
The results obtained from the Nacozari power-plant are best shown by the extracts given in the following tables from a very complete record made during an entire run on one generating set by Dr. A. Sandberg, metallurgist of the works, and Mr. George M. Douglas, engineer in charge of the power-plant.

Average Composition of Gas from Different Fuels.

Fuel.	Components. CO.	H.	CH_4	CnH_2N.	CO_2	O.	N.	Calorific Value. B. T. U. Per Cu. Ft. at 60° Fah. and 29.9 In. Barometric Pressure.
Anthracite coal	21.6	12.68	1.86	0.18	8.1	0.2	55.38	131.1
Bituminous coal	20.32	13.08	2.35	0.2	7.66	0.04	55.35	133.47
Wood	13.27	20.97	2.61	0.28	15.96	0.11	46.80	140.22

The sustained capacity and satisfactory working of a gas-engine depend on its being kept in thoroughly good condition. The principal meaning of "good condition" is, that the valves should seat freely and be tight when seated; and that the inside of the cylinder should not be foul with carbonized oil. Leaky or sticky valves and dirty cylinders are the causes of nine-tenths of the ills peculiar to gas-engines. A gas-valve sticking open may cause the engine to run away; but, with this one exception, every other trouble manifests itself by reducing the capacity of the engine, or by bringing it to an actual stop. Hence good condition is essential to satisfactory operation. It is easily maintained by periodical attention—cleaning the cylinders, slightly regrinding the valves to their seats, and a care of the igniters, which differs according to the type of igniter used.

The most economical capacity of a gas-engine is its absolute maximum capacity, when at every admission it takes the maximum quantity of mixture, in the best proportions of air and gas, and ignites it at exactly the right point. The adjustments necessary to obtain all these conditions, with certainty at every stroke, are too fine for any but test-conditions. To allow for variations, which are inevitable, even under the best conditions in commercial working, the maximum capacity should be discounted about 15 per cent to get a figure which may be called "maximum commercial capacity," and nothing more than this latter figure should be counted upon for those short periods which occur, even with the most uniform load, when the load rises to a maximum greater than the average. In other words, this commercial maximum capacity should equal the peak of the load curve. With a very variable load, therefore, an engine-capacity is required greatly in excess of the average power demand; and any method of averaging the power-variations of individual loads by driving several such loads from one group of engines will reduce the total engine-capacity to be installed. The central power-house plan with electrical distribution, is, therefore, one which is well worthy of careful consideration for at least some portion of any gas-power plant, in spite of the heavy tax to be paid in transformation- and transmission-losses, losses in the electric generator, the line and the motor, which practically amount to 25 per cent of the brake horse-power delivered by the engines.



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Record of Six Days' Run, from Nov. 21 to 27, 1902.
Measurements of Power.

Date.	Hours Run.	Average Readings at Switch-Board. Amperes.	Volts.	E. H. P.	In Gas-House. Equiv. B. H. P. Allowing 90 Per Cent. Efficiency in Generator.	Average E. H. P. Used.	Vacuum at Exhauster in Inches.
Nov. 21	14	1380	250	464	515	13.1	14
Nov. 22	18	1274	250	428	475	14.9	20
Nov. 23	24	1398	250	470	522	15.9	24
Nov. 24	24	1210	250	404	448	17.3	26
Nov. 25	24	1330	250	446	495	18.0	27
Nov. 26	24	1285	250	431	474	18.7	28
Nov. 27	10	1328	250	445	494	19.1	31
Total	138	....	...	...	...	....	..
Average	...	1315	250	440.7	489	16.5	24.2

Analyses of Gas Made.

Date.	Gas Supplied to Engines. CO.	H.	CH_4	CnH_2N.	CO_2	O.	N.	B. T. U. Reduced to 60° F. and 29.9 in.	Per Cu. Ft. Actual at 80° F. and 26.4 in.
Nov. 22	13.40	17.70	3.32	.20	15.00	.2	50.18	135.92	115.4
Nov. 23	14.00	19.50	2.75	.20	15.80	.4	47.35	137.9	117.0
Nov. 24	14.80	20.03	2.62	.40	14.00	.2	47.95	144.05	122.2
Nov. 25	14.50	19.97	1.41	.30	15.60	.2	48.02	129.1	108.8
Nov. 26	13.30	19.41	2.81	.50	15.00	.7	48.28	141.78	120.2
Nov. 27	13.20	18.00	1.46	.50	14.10	.4	52.34	122.44	104.0
Average	13.86	19.10	2.39	.35	14.9	.35	49.04	135.22	114.6
Water Gas.									
Nov. 24	8.90	55.64	3.37	.40	21.00	.4	10.49	246.62	....
Nov. 25	10.40	53.80	3.30	.50	22.40	.3	9.30	246.44	....
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Average	9.86	54.14	3.45	.46	21.3	.26	10.61	246.88	....

When the original load on a gas-engine, which is belted directly to the shafting, outgrows the capacity of the engine, it is generally difficult to devise a satisfactory means of supplementing the engine-power. There is a fixed charge of cost and trouble attaching to each engine, irrespective of its size, which makes it undesirable to use engines much smaller than the average size. This is frequently a hampering condition. Gas-engines are not self-starting, and cannot be started with the load on. Tight and loose pulleys will answer for small engines, but those of more than moderate power need clutch pulleys on the shafting. They need good foundations, and occupy a floor space large in comparison with their power. Additions generally require floor or shafting space which is not conveniently available. And, furthermore, when several engines are driving directly on the same shaft, it is difficult to be certain that the proportion of gas to air, and other adjustments, are so regulated that each cylinder is doing its full share of the work. In fact, it may be taken as certain that the combined capacity obtained from such a group of engines will not be equal to the sum of their individual capacities. In their adaptability to meet changing power demands gas-engines are much less flexible than are steam-engines.

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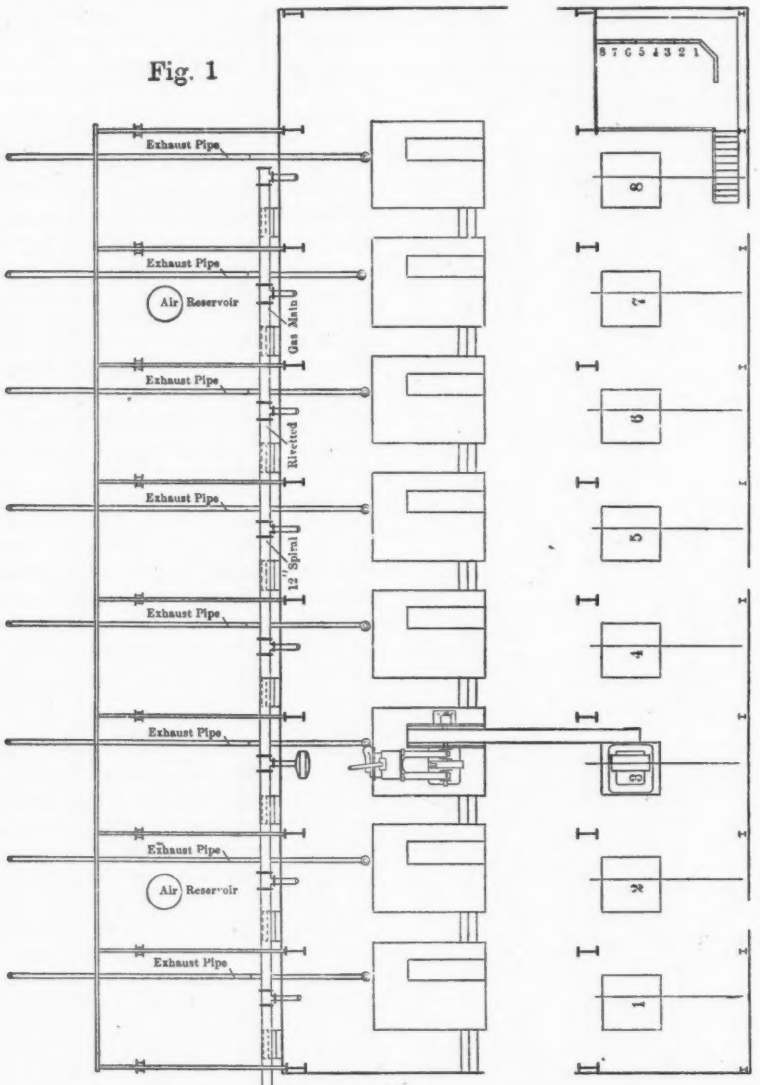

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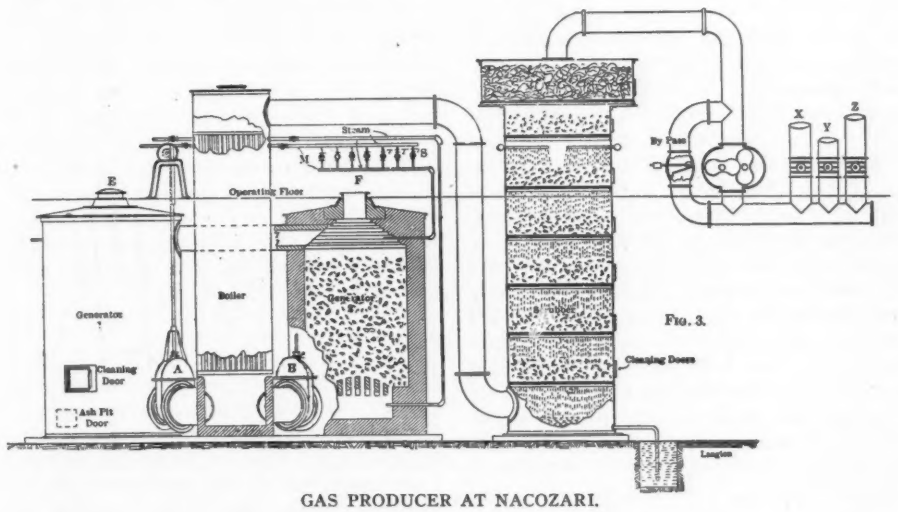

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Average	13.86	19.10	2.39	.35	14.9	.35	49.04	135.22	114.6
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THE PAYNE-GILLIES COPPER PROCESS.

By F. Danvers Power.

This process is suitable for the extraction of copper from poor ores which are too silicious for smelting purposes and which circumstances will not allow to be concentrated mechanically at a profit. It has been perfected by Messrs. W. Payne and J. H. Gillies, of New South Wales, who claim, among other things, that they have a new method of using ferrous sulphate in conjunction with pyrite for the treatment of copper ore, and also in procuring and maintaining the proper strength of the sulphate solution. The object of this process is to prepare cupriferous ores for leaching with water, by means of a sulphatizing roast. This is done by saturating the pulverized ore with the mother solution from the vats in which the copper from a previous leach has been precipitated on scrap iron; some pyrite is also generally added to the charge; the whole is then treated in a reverberatory furnace. In this way the difficulty of stopping a roast of raw ore at that point where the copper is converted into the soluble form is overcome, also the expense of leaching with sulphuric acid when that point is overshot.

Some forty or fifty years ago copper was treated at Agordo in Italy by crushing it fine, and mixing it with a solution of ferrous sulphate, after which it was dried and fired in heaps for three to five months. The ferrous sulphate was ultimately decomposed into ferric oxide and sulphuric acid, the latter combining with the copper present to form cupric sulphate, which is readily dissolved out with water and precipitated on scrap iron as cement copper. The Payne-Gillies process is carried out in a less crude manner, and is very much quicker.

If the ore to be treated contains more than five per cent of sulphur, it is given a preliminary roast, so as to bring the sulphur down to that percentage or less. If in lumps, the ore may be calcined in stalls or heaps, which, besides getting rid of the excess of sulphur, permits the pieces of ore to crush easier afterward. The crushed ore, generally mixed with a small proportion of iron pyrite, is saturated with a solution of ferrous sulphate, after which it is roasted at a moderate heat. The amount of ferrous sulphate added depends on the percentage of copper present. The finer the ore, the more thorough the mixture, and the more solution the ore is capable of holding. Experiments prove that oxidized ores, or those containing not more than five per cent of sulphur, give the maximum extraction of copper by leaching when crushed to pass through a 30-mesh sieve. An excess of ferrous sulphate to a charge of ore about to be roasted does not harm the process as now conducted, except to waste the sulphate, but at first it was found that an excess of ferrous sulphate over that necessary to combine with the copper present became converted into ferric sulphate ($Fe_2O_3 3SO_3$) which, being soluble, was leached out with the copper sulphate, and in the precipitating vat consumed more iron than would be the case were it not present. As all the mother solution from the precipitation vats is used to saturate the ore for the next charge to be roasted, when treating ore of a fairly regular composition, the required amount of ferrous sulphate practically regulates itself, with the assistance of a little iron pyrite. There is little or no sulphate of iron left in the charge when drawn from the furnace, if the temperature and rate of discharge are properly regulated. The roasting is done at a low temperature with but a slight addition of air. The heat of the furnace is gradually increased, commencing at a very low temperature in order to dry the ore, that is, if the ore is not dried before charging; as ferrous sulphate is decomposed at a lower temperature than cupric sulphate, the latter remains after the former is oxidized. If more than five per cent of sulphur is present in the charge as pyrite, the temperature becomes so great that it cannot be properly regulated. If there is little or no sulphide in the ore, that is, if the ore has been oxidized either naturally or artificially, some pyrite is added before the ore is roasted with the ferrous sulphate. This addition of pyrite is found to assist the formation of anhydrous sulphate of copper, and makes good any loss of sulphurous and sulphuric anhydrides in the fumes that may take place during the roasting; it is also found to act favorably by creating a uniform temperature through the body of the ore owing to the combustions of the sulphur.

At the works where Messrs. Payne and Gillies test various ores by their process, a Merton furnace is used for roasting the ore. About an hour is required for the ore to pass through the furnace, which at this rate is capable of treating about 25 tons per day. The rate naturally varies with the condition of the ore; whether very moist, and the percentage of sulphur present. The discharge may be regulated by the rate of feed and by increasing the number of revolutions of the stirrers; a common rate of revolution for a rabble is one a minute. Although the hearth of this furnace is level, the ore when fed rapidly lies at an angle, and the motion of the ore at the upper end tends to push forward the ore lower down. Producer gas made from coal is used for the main hearths, and will eventually be also applied to the finishing hearth. Any lumps that may be formed in the ore as it dries in the upper part of the furnace are broken down by the time that the ore is discharged.

Water is run into a vat and the hot roasted ore tipped in through a grating so as to help distribute it. The whole vat is not filled with water at once; the water is only allowed to be an inch or two above the ore, so as to cover it, and naturally becomes very hot, the heat assisting in the solution of the cupric sulphate. It was found that when a vat is filled with water, and the ore tipped in, that the latter caked and did not get properly saturated, also the slimes separated out and retarded thorough percolation. When the vat is full, the ore is leached till there is no sign of copper in the solution when tested with ammonia. It takes about 24 hours to completely leach a vat of ore. If there are ample precipitating appliances, the leaching is continuous, soaking of the ore being unnecessary, as the anhydrous sulphate of copper is readily dissolved, and only requires washing out. The strong solution is then run into a precipitating vat, where the copper is thrown down as cement copper on scrap iron. The time required to precipitate the copper in solution varies with the percentage of copper present, and the form of iron used: the temperature at which the precipitation takes place also has a decided effect, heat being found to assist precipitation. A six per cent copper solution, for instance, can be precipitated in about two hours, provided the iron presents a fairly large surface, and the temperature is maintained a little below boiling point. The solution is made hot, first by the ore from the calciner through which it percolates, and afterwards by exhaust steam or boiler steam which circulates through a coil of lead in the precipitation vat. None of the solutions are thrown away; the mother solution containing the sulphate of iron after the copper has been precipitated, is all used to saturate a subsequent charge, prior to sulphatizing roasting; the wash is used for dissolving out the copper of the next charge.

It is claimed that after this treatment, cupriferous tailings containing gold are suitable for cyaniding in the usual way, for although assays may show copper to be present, such copper is locked up in particles that cannot be dissolved by the solutions of any leaching process, unless the sand is crushed still finer; also, that though there may be an appreciable amount of copper thus shown, the proportion of gold locked up at the same time is generally tooo small to be worth considering.

ZINC IN NORTH WALES.—The London *Engineer* says: "A new process, introduced at the Hafna mine, North Wales, promises to revive a decaying industry. This, briefly, is the dissolution of wasted ores in sulphuric acid and the precipitation of oxide of zinc by ammonia. The oxide is then subjected to intense heat in a muffle furnace. One result of the new process will be the utilization of the great heaps of waste tailing, which can be treated as readily as the original ore. Sir William Ramsay was present at the mines recently, near Llanrwit, with other scientists, and gave an exhibition of the method in a most satisfactory manner."

THE NEW RADIO-ACTIVE ELEMENTS.—According to Mme. Curie, three strongly radio-active substances have been discovered in pitchblende: (1) Polonium, allied to bismuth and separated from it by (a) fractional precipitation of the sulphides from a chlorhydric acid solution; (b) fractional sublimation of the sulphides in vacuo; (c) fractional precipitation of the basic nitrates. (2) Radium, allied to barium, and separated from it by fractional crystallization of the chlorides from water, dilute alcohol, or water acidified with chlorhydric acid. (3) Actinium, allied to thorium, from which it has not been found possible to separate it. Radium is the only one of these new elements which has yet been isolated in the form of a pure salt.

DETERMINATION OF TUNGSTEN IN STEEL.—E. Krahn proposes the following method for the determination of the tungsten content of steel (*Stahl und Eisen*, January 1, 1904): Dissolve 2 grams of the material in a mixture of equal parts of sulphuric and phosphoric acids with three pints water. Add 3 c.c. of potassium permanganate solution from time to time while the steel is dissolving, and when cold divide solution into two portions. To one portion add 200 c.c. sulphuric acid (1 to 3) and 40 grams zinc shavings, heat, and then allow to cool in a current of carbon dioxide. Filter off any zinc that remains and titrate with permanganate. In the second portion the iron can be determined by the Reinhardt method, or with stannous chloride and iodine, and the tungsten estimated by difference.

THE NICKEL DEPOSIT OF SOHLAND, SAXONY.*

BY WALTER HARVEY WEED.

This remarkable deposit was discovered near Carlsruhe, in 1900, in a region famous for hundreds of years for its mineral wealth, and the cradle of the modern mining industry. As might be inferred from its position in so carefully exploited a region, the discovery was made where soil and alluvium concealed the rocks, and was made by accident. A well sunk for a tannery yielded water so peculiar in taste and color, that a sample was sent to Freiberg for analysis. The metallic contents of this sample led to exploration work, revealing the discovery of the deposit. Since then several mines have been opened in the deposit. The ore contains 4 to 5 per cent of nickel and a little cobalt, with 2 per cent copper.

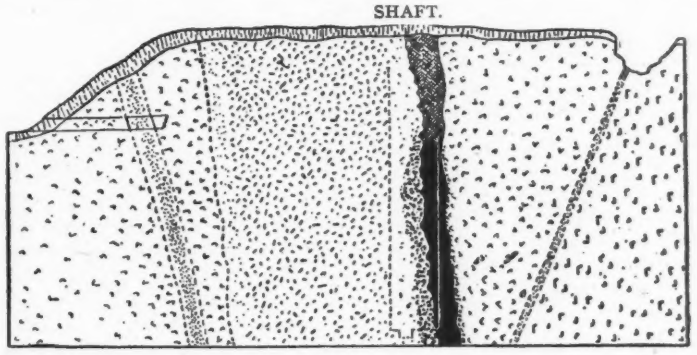


FIG. 1.

The structural relations of the deposit are simple. It occurs as part of a dike of diabase (proterobase, that is, a hornblende diabase), which is 33 to 65 ft. wide, and as developed is known for 2,300 ft., while observations with the magnetic compass indicate a length of 0.9 mile. This dike has nearly an east and west course, and cuts through finely crystalline granitites and the overlying diluvial strata. Until developed by mining it was deeply covered by soil and disintegration products. The ore occurs along the north wall of the dike in a streak 6 to 8 ft. wide. Only traces of ore occur along the south wall. As shown in cross section (Fig 1) the ore-body has an irregular, wavy boundary, and it was at first regarded as an instance of segregation from the molten dike rock before cooling. The dike rock is itself peculiar in that it contains ill-defined segregations of basic masses rich in spinel, which grade into the normal rock, while other nodular segregations of sillimanite-rock carry not only spinel but sapphires.

The ore consists of pyrrhotite (magnetic pyrite) in a solid mass, grading into an irregular intergrowth of rock and ore. Ordinary iron pyrite also occurs, and occasionally chalcopyrite, but the nickel is found only in the pyrrhotite.

A peculiar feature of the ore is its occurrence as disseminations about a barren or nearly barren sphere of rock as shown in Fig. 2. The presence of these ellipsoidal masses of lean rock confirm the conclusions expressed concerning the genesis of the ore.

The genesis of this deposit has been carefully worked out by Dr. Beck from a study of the field evidence, of the association of the minerals in numerous hand specimens and microscopic thin sections examined under the microscope. These conclusions are particularly interesting at the present time because they apply to analogous deposits elsewhere.

From the brief description just given of the deposit it is evident that the theory of magmatic segregation is inapplicable. Dr. Beck's views concerning the genesis of the deposit are given in full on account of their important bearing on American deposits. "The various sulphides of the deposit, nickeliferous pyrrhotite, chalcopyrite and pyrite, could only have been formed after complete differentation of the magma and its solidification into proterobase, diabase, and the spinel rocks we have described. After the consolidation of the rock a *partial corrosion of the primary silicates and the formation of secondary actinolite as well as of chlorite, talc, and serpentine,* preceded the formation of the ore (as shown by microscopic studies whose evidence is given in detail in this paper). These alterations are hardly conceivable except as a result of aqueous agencies. The alteration of augite and brown hornblende to fine tufts of green hornblende is inconceivable as a magmatic alteration, whereas it is well known as an incidental phenomenon in dynamic and contact metamorphism. The author years ago showed the wide-

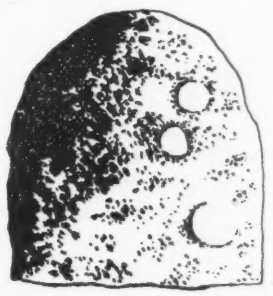


FIG. 2.

spread occurrence of this latter alteration in discussing the amphibolitization of the diabasic rocks of the contact zone of the Elk Valley mountains.' In the Sohl deposits contact metamorphism is out of the question. Dynamic metamorphism is practically excluded because the undoubtedly strong compression and partial crushing of the granitic country rock seems to have *preceded* the intrusion of the proterobase dike.

The great fissure which the dike occupies was probably formed during this compression. While the fragments of granite in the proterobase and also the granite of the dike-walls show in part a distinct cataclastic structure, the proterobase itself shows but slight evidence of such shearing forces.

The dike rock is, indeed, cut by fissures along which shearing has taken place, and these fissures are coated with talcose decomposition products, but away from these fissures, though the rock does contain newly-formed minerals, it shows no cataclastic structure. It is everywhere apparent that the actinolite was formed simultaneously with the sulphide ores. This actinolite forms tufts of parallel fibers projecting outward into the mixture of pyrite as if they had grown in a cavity, a theory which is out of the question. It is possible, however, that the peculiar formation of secondary amphibole and ore is the effect of metasomatic processes. (It bears a close resemblance to the Rossland, B. C., occurrences, described by W. Lindgren.) Metalliferous solutions etched away the primary silicates of the proterobase, and in proportion as they became charged with the material taken into solution, the metallic sulphides were precipitated, a part of the dissolved silicate being at the same time redeposited in the same form. These solutions, we believe, to have been thermal springs rising along the walls of the proterobase dike and in narrow fissures adjacent to it. They were derived for the same deep-seated magmatic hearth from which the proterobase itself arose. These mineralizing waters also penetrated the granite wall-rocks for a short distance. Thus the mineralization of the proterobase by thermal water would have to be conceived of as the lingering remnant (last echo) of the diabasic eruption, a phenomenon analogous to that in which many tin veins are explained as due to eruptive after-effects (pneumatolytic) of granite intrusions.

The thermal character of the waters and their origin from the deep-seated diabasic magma are indicated by the limitations of the ore impregnation to the proterobase dike, and especially to the part next to the wall, a feature that also obtains at Schweidrich, Saxony. If there were merely a lateral secretion by descending water, a leaching out of the proterobase (which perhaps was primarily nickeliferous and cupriferous, even in its upper portions) and a re-deposian of the dissolved metallic compounds, it is difficult to see why this re-de position should have been confined to the selvage. It is also difficult on this hypothesis to explain the phenomena of corrosion of the primary silicates of the proterobase.

*Abstract of paper by Dr. Richard Beck, of the Freiberg Mining Academy, 'Die Nickelerzlagerstätten von Sohland.' *Zeitschrift* der Deutschen Geologische Gesellschaft, 1903.

ELECTROLYTIC SEPARATION OF NICKEL AND COPPER.—The separation of nickel and copper by electrolysis in an alloy containing Cu 26 per cent, Ni 50 per cent and Fe 21 per cent, is described by E. Günther (*Zeitschrift Vereines Deutscher Ingenieure,* p. 574, 1903). The iron was purposely left in the alloy, but it caused no difficulties in the process of the separation. The following scheme of treatment was adopted by the author: 1. Solution of the alloy which was employed as anode in the bath. All the metals passed into solution, the copper being deposited at the cathode, while the iron and nickel remained in solution. 2. Separation of the last traces of copper from the solution and production of a pure nickel salt solution by removal of the iron. 3. Treatment of the last solution for production of metallic nickel. Copper testing 99.97 per cent and nickel testing 99.90 per cent were obtained by the author, but no information is given as to the percentage of the recovery relative to the quantity of alloy used.

LEAD ORE IN BURNET COUNTY, TEXAS.

By Wm. B. Phillips.*

In the northwest portion of Burnet county, Texas, 80 miles northwest of Austin, there is a deposit of galena which appears to be of commercial importance. It is on Silver creek, a tributary of Beaver creek, on land belonging to Dr. William Osborne, of Bluffton, Texas. It has been prospected in a desultory and unsystematic manner within the last few years, and at one time was worked for lead. The galena is carried by a coarse-grained, friable green sand, lying immediately upon the coarse granite (pegmatite) of the region, and also by the magnesian limestone which overlies the green sand. The thickness of the lead-bearing rocks is from 6 to 12 ft., the galena being distributed in it as grains and as bunches of almost pure mineral. Assays made in the laboratory of the University Mineral Survey show that the yield in lead varies between 10 and 20 per cent, with no silver or gold. Some assays, made elsewhere, have shown a small amount of silver and one or two assays have shown a workable amount of gold. But on the whole it is thought that the chief value will be in lead, although it is not improbale that stringers of silver and gold-bearing material may be encountered. The dip of the strata is from 10° to 15° to the south and west, the heavy magnesian limestones lying comparatively undisturbed. On the south side of Silver creek, near the residence of Dr. Osborne, the dip is towards the south and west, but on the north side of the house the dip is toward the north and east, the valley there occupying an old anticline. The galena is a contact deposit, showing in the material immediately above the granite and in the limestone above. The galena itself comes to the crop, but no other lead compounds have been observed.

The geology of the region has been discussed by Dr. T. B. Comstock in the 'First Annual Report' of the Geological Survey of Texas, 1889. He thought that the country was Silurian, and that the rocks along Beaver creek might be considered as equivalent to the Lower Canadian. Fossil remains are scarce, and when found are sadly mutilated, so that the question is largely one of stratigraphy. No detailed study of the region has yet been made, but enough is known to warrant the opinion that it is not later than the Silurian. The granite seems to have been intruded as laccolites between limestone strata, for limestones of the same age are found both below and above the granite, along Beaver creek. No determinations or estimates of the thickness of these sheets of laccolitic granite have been made.

It is not my present purpose to discuss purely geologic questions, but to direct attention to the commercial possibilities of these deposits. They seem to me to warrant the expenditure of money in thorough prospecting. They have been traced for more than half a mile along the strike, and appear to hold their own in a remarkable degree. The ore could be easily concentrated; there is a good supply of excellent water all the year; flux within a stone's throw, and a large extent of cedar forest for charcoal, hard wood also being within reach. It is likely that charcoal could be delivered at any point on Silver or Beaver creek, for 5c. a bushel. Ordinary labor commands from $1 to $1.50 a day. At present the transportation facilities are not very good, the nearest railroad station being 20 miles distant, Burnet, or Kingsland, on the Houston & Texas Central Railway (Austin & Northwestern). At Burnet a branch of the same road runs to Lampasas, on the Gulf, Colorado & Santa Fe Railway. Several years ago a line was surveyed from Lampasas to Llano and about 16 miles of it, from Lampasas, graded. The extension of this road from Lampasas to the Colorado river would bring the lead district within an hour's ride of rail, one survey, indeed, coming within a quarter of a mile of the present openings.

No zinc has been found along Silver creek, but a few miles to the southeast it is reported that zinc blende has been found. A good piece of blende was shown to the writer, with the assurance that it came from Burnet county and within four or five miles of Silver creek. Geologically, there is no reason why blende should not occur in these limestones. It has certainly been found in Llano county, on the west side of the Colorado river, and in a region of the same age as this.

The Silver creek galena is distinguished by its purity, and it is likely that lead of a high quality could be obtained from it.

Lead ore is comparatively scarce in Texas. Some silver-bearing galena has been shipped to the El Paso smelters from the Bird mines, near Alpine, Brewster county, and a few carloads a year come from the Shafter district, Presidio county. Some active work is now being carried on in the Sierra Diablo, north of Van Horn, El Paso county. The Burnet county ore would have to be treated on the spot, as it could not be hauled to El Paso. It is fortunate that the deposit occurs in a wooded country, with good water and flux. It is thought that in the lead deposits of Silver creek we have commercial possibilities of no mean kind. Having looked the district over and being conversant with the local conditions I can recommend it to those who may be interested in such matters.

*Director, University of Texas Mineral Survey, Austin.

SILICATE STONE.—This is a new product, now being introduced in America by the Silicate Stone Company, of New York. It is an English invention, Mr. L. P. Ford being patentee. Silicate stone consists essentially of silica and lime. The proportion of lime used is 5 to 10 per cent, the purity of the silica substance regulating the quantity of the lime. When the proper mixture has been made it is put in molds, water and steam are injected, and the whole subjected to a high heat and pressure. In this way, it is claimed, the lime combines with part of the sand and forms a silicate of lime, to the presence of which the mechanical strength of the stone is principally due. The crushing strength is given as 10,776 lb. per sq. in., and tensile strength, 834 lb. per sq. in. The process takes six hours from the time the mixture enters the molds until it comes out ready for shipment. In appearance the stone resembles granite, though the color can be changed in manufacturing to suit the taste of consumers. It is hard and compact and of uniform fracture. It is adapted to working in intricate ornamental design. It is claimed that it has the property of resisting the injurious action of salt or fresh water and varying atmospheric conditions.

A WOLLASTONITE ROCK-MASS IN MEXICO.

By H. F. Collins.*

The main geological feature of the immediate neighborhood of the Santa Fé mine, which is situated about nine leagues nearly due east of the departmental town of Pichucalco, is a dome-shaped mass of wollastonite, the horizontal section of which, at the lowest level where it has been sufficiently explored to determine its shape, takes the form of an irregular ellipse about 1,200 ft. long by 480 ft. wide. With the exception of the ore-bodies, which are developed on the outskirts of this mass and close to the contacts with other rocks, the whole deposit is of nearly uniform composition, consisting of the mineral wollastonite in a nearly pure condition and very coarsely crystallized. Toward the outskirts of the mass the wollastonite contains a small proportion of garnet (andradite), and passes, usually by insensible gradation, into the pay-ore. This is irregular in form and distribution, and, while wollastonite still predominates, there are present small proportions of garnet, quartz, calcite, semi-opal, and other non-metallic minerals; the principal ores are bornite and chalcopyrite, accompanied by small quantities of galena, pyrite, fahlerz and enargite.

Except near the edge of the deposit, the massive wollastonite is not crystallized confusedly from a number of centers, but shows a parallel orientation over distances of many feet. The mineral has two developed cleavages approximately at right angles to each other, and the mass breaks readily into fissile rectangular blocks; the resulting structure resembles that of satin-spar, the parallel crystalline fibers often, however, reaching three or four feet in length. In color the wollastonite is—except where stained by traces of iron and other minerals—pure white and translucent; its luster varies from vitreous to satiny; its hardness is 5, and its specific gravity (average of several determinations) is 2.88.

Although a mineral of somewhat wide distribution, wollastonite has hitherto never been known to form the sole constituent of an important rock-mass, but is generally found associated with garnet, epidote, idocrase, and other well-known products of metamorphic action upon impure limestones near their contacts with igneous rocks. This particular mass of wollastonite probably is not a product of metamorphism *in situ*, but has been intruded in a perfectly plastic condition, the ore-bodies having been separated from it by magmatic segregation. The principal arguments in favor of such a supposition are:

1. The wollastonite is absolutely isolated from the limestone rocks, the nearest outcrop of which is situated at a distance of one mile from the outskirts of the mass.

2. It is completely surrounded on all sides by granite, felsite, diabase, and other igneous rocks. The felsite and diabase are in close association with the wollastonite, and the granite surrounds them all at a short distance.

3. The mass is hump-shaped, or dome-shaped, its outer surface dipping away from the center in all directions. The top of the dome only just reaches the present surface, and at the time of its intrusion probably fell short of reaching the then existing surface by several

*Abstract from 'Notes on the Wollastonite Rock-Mass, and its Associated Minerals, of the Santa Fé Mine, State of Chiapas, Mexico.' By Henry F. Collins, A.R.S.M. *Mineralogical Magazine*, December, 1903; Volume XIII., No. 62, pp. 356-362.

thousand feet. No very long lapse of time, geologically speaking, is required for the denudation of a few thousand feet of rock in a mountainous tropical region possessing an average rainfall of about 200 in. per annum.

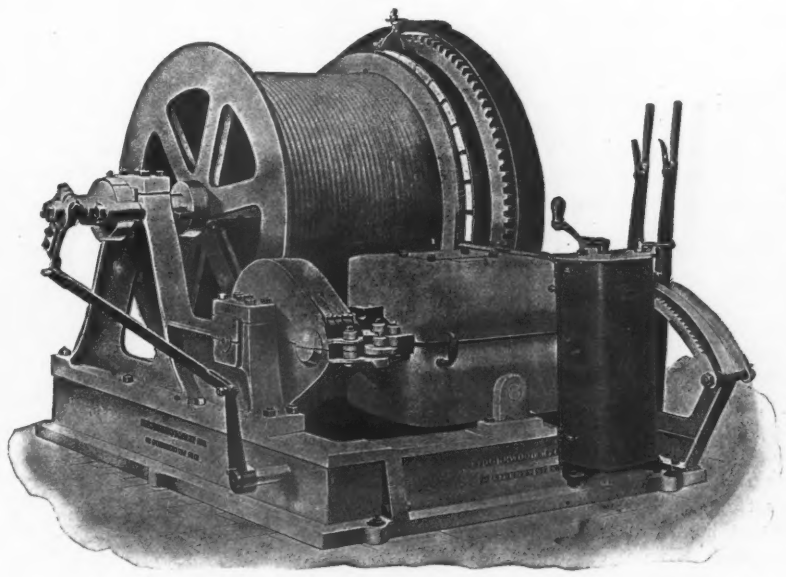
4. At a depth of 200 ft. below its highest point, mining operations have fairly well mapped out the extent and form of the mass, and have proved it to cover an area about 1,200 ft long by 480 ft. wide, while 100 ft. deeper its unbroken character has been already proved over an area at least 600 ft. long by 240 ft. wide. Near the upper surface and outer edge of this mass the pure wollastonite is contaminated with other minerals, is much split up, and includes fragments of the surrounding rocks; it is near this outer contact that ore-bodies have been developed, and that evidences of fissuring and of secondary alterations are met with. Near its outer fringe, moreover, the wollastonite has been penetrated by trap dikes of an obviously later origin. Taking, however, only the central unaltered and undisturbed core of the mass, which certainly contains over two million cubic yards of material above the deepest level at which it has been yet opened up, while it presents every indication of continuing unaltered down to unknown depths, it is noteworthy that in the thorough exploration of this very large mass of rock by a network of workings in all directions, no variation in composition is anywhere observable between different parts of the mass, nor in the relative proportions of lime and silica present, no vestige of a transition from limestone to wollastonite, and no indication of a variation in the crystalline structure, which is perfectly developed and uniform throughout.

It is admittedly a unique occurrence for so large a mass of eruptive rock to be composed of practically a single mineral species, but it seems difficult to conceive that so large a mass of limestone could be gradually metamorphosed by silicious solutions or vapors in such a way as to produce a pure anhydrous silicate of lime of absolutely definite composition and of uniformly macro-crystalline structure throughout. In portions of the rock-mass which are traversed by master-joints the crystalline fibers usually run perpendicularly to these joints, and are often strictly parallel to each other over a width of as much as 50 ft., and absolutely continuous for 4 to 6 ft. from joint to joint. After long and careful study of the conditions on the spot I am convinced that these and all the other observed facts can only be explained on the supposition of the eruptive origin of the wallastonite mass.

BOILER EXPLOSIONS IN GREAT BRITAIN.—The London *Engineer* says: "The twenty-first report on the working of the Boiler Explosions Acts, for the year ended June 30, 1903, has been issued by the Board of Trade. During the twelve months 22 persons were killed and 67 injured by boiler explosions, the average numbers for the 21 years since 1882 being 29 and 61, respectively. There is, it is stated, no definite information available as to the number of boilers in use in the United Kingdom, but it may be fairly assumed that there has been a considerable increase during the last 20 years. The report points out that there is no tendency to any increase in the number of serious explosions or in the loss of life from such casualties."

AN ELECTRIC MINING HOIST.

The accompanying illustration shows a compact and simple pattern of electric mining hoist. It is designed for use with a direct current of 500 or 250 volts, and embodies in its construction various features characteristic of all hoists made by the same makers. As will be seen by the illustration, the entire hoist, including the drum, motor and controller, are mounted complete on a bed-plate. The resistance-boxes are usually separate from the hoist, being placed so that the heat generated may not be annoying to the operator. In the smaller sizes it is sometimes desired to have the machine self-contained and portable, and in this case the resistances are of special form, and attached to the inside of the bed-plate. The friction drum is of the standard Lidgerwood form and equipped with the latest improvements. The motor used is of the armored type, especially adapted for hoist use. All the moving parts are protected from the dust and moisture by a suitable casing, while the gearing from the motor to the intermediate shaft is enclosed in an oil-tight case. This gearing is cut. The drum gearing is cast from standard patterns, and is protected by a guard-band. The controller, which is of the railroad type, is provided with a reversible switch, and so mounted as to be conveniently handled by the operator. The friction and brake levers are mounted in a rack with notched quadrants, and are fitted with thumb-latches. These hoists are made by the Lidgerwood Manufacturing Company, of New York, and a large number are already in use.



DIRECT CURRENT ELECTRIC HOIST FOR MINES.

IRON AND STEEL PRODUCTION OF BELGIUM.—The output of iron and steel in Belgium for the full year is reported as below, in metric tons:

	1902.	1903.	Changes.
Pig iron	1,069,210	1,216,500	I. 147,290
Wrought iron ..	377,910	401,500	I. 23,640
Steel ingots	776,875	981,740	I. 204,865
Finished steel ...	755,880	958,860	I. 202,980

The increases in all branches of the trade were considerable, being 13.8 per cent for pig iron, 26.4 per cent in steel ingots, 26.9 per cent in finished steel, and 6.3 per cent in wrought iron.

RECENT LITERATURE OF ECONOMIC GEOLOGY.—III. LEAD AND ZINC.

By H. FOSTER BAIN.

Zinc and Manganese Deposits of Franklin Furnace, N. J. By J. E. Wolff. (*Bulletin* 213, United States Geological Survey, pp. 214-217).

These famous deposits have been re-examined by Professor Wolff in connection with his survey of the Franklin Furnace quadrangle. As is well known, the ores consist of an intimate mixture of calcite and certain rare zinc, iron and manganese minerals, not elsewhere of economic importance. The proportions of the minerals vary greatly. In the 'shot' ore, rounded grains occur together without marked banding; at other times banding and foliation appear, the minerals then occurring in flattened lenses or padlike masses parallel to the foliation; in still other cases, masses and large crystals form a pudding-stone with the calcite. In general form both the Mine Hill and the Stirling Hill deposits seem to be bedded veins which have been deformed contemporaneously with the surrounding pre-Cambrian gneiss, from which the ore is separated by a thin body of white limestone. The interpretation of the Mine Hill deposit, upon which all observers agree, is that the east-west veins are a continuous plane body deformed in a synclinal trough which narrows to the south and finally spoons out at the surface; less positive is the theory that there is a sharp, closely-compressed anticline on the east side with the axis pitching 27° or more to the northeast. This pitch agrees with that of the gneisses lying just west and is an argument for the contemporaneity in the present form of the gneiss, white limestone and ore.

Granite or syenite occurs in the mine, cutting the ore-bodies. The latter are metamorphosed along the contact and there is an abundant development of rare contact minerals. There can be no doubt that the granite is later than the ore-body and intrusive, so that theories of genesis founded on the presence of the granite must be discarded.

Despite the abundant literature relating to these occurrences (see Kemp, 'Ore Deposits,' p. 257) the genesis of the ores has heretofore been quite uncertain. Professor Wolff does not give a final answer to the question; he ar-

gues, however, that they are contemporaneous with the limestone and gneiss, and believes that their present structure and mineralogical composition are to be traced to metamorphism incident to the deformation of the rocks; that they originally represented a local segregation of zinc, manganese and iron which may have been in the form of sulphides or carbonates. Since sphalerite and carbonates have both been found in the deposits, this explanation has many elements of plausibility, though there is little positive fact upon which to base a theory.

Lead, Zinc and Fluorspar Deposits of Western Kentucky. By E. O. Ulrich and W. S. Tangier-Smith. (*Bulletin* 213, United States Geological Survey, pp. 205-213.)

The little known area in western Kentucky which has recently attracted attention as a producer of zinc ore and by its increased production of fluorspar is described, Mr. Ulrich discussing the stratigraphy and Mr. Smith the ore-deposits. Mr. Ulrich estimates the production during the first seven months of 1902 at 12,000 tons of fluorspar and 2,450 tons zinc carbonate.

The rocks of the region consist of St. Louis and Princeton limestones, the shales, limestones and sandstones of the Chester and the basal sandstones, conglomerates and shales of the coal measures. These are cut by peridotite dikes and have been much broken and faulted; faults of 600 to 1,400 ft. occurring. The fault-lines are direct and linear, and the fault-planes are vertical or nearly so. The ore-bodies occur on these fault-planes where one or both walls are limestones, showing a particular preference for the Princeton formation. The veins are arranged either parallel or *en echelon* and are usually 6 to 8 ft. wide. Vertical shearing accompanied the faulting and the walls, when composed of sandstone, have frequently been so silicified as to stand up above the general erosion surface as quartzite reefs. Fluorite is the most abundant mineral, but at the Old Jim mine, in particular, important bodies of zinc carbonate have been uncovered. Barite, calcite, galena and blende occur frequently. Oxidation extends to a depth of 100 ft. It is considered uncertain whether the fluorite decreases with depth though reported in some cases. Galena is more abundant at the surface, and there is possibly some secondary concentration of blende at the water level, though there seems to have been little surface alteration. The origin of the ores is not discussed. The region is considered to be one of growing importance.

BOOKS RECEIVED.

In sending books for notices, will publishers, for their own sake and for that of book buyers, give the retail price? These notices do not supersede review in a subsequent issue of the ENGINEERING AND MINING JOURNAL.

South Australia. Agricultural and Live Stock Statistics, 1903. Adelaide, S. A.; Government Printer. Pages, 68.

Interstate Commerce Commission. Accident Bulletin No. 9. Washington; Government Printing Office. Pamphlet, 12 pages.

South Australia. Occupations of the People According to the Census of 1901. Adelaide, S. A.; Government Printer. Pages, 84.

Facts About Peat, Peat Fuel and Peat Coke. By T. H. Leavitt. Boston, Mass.; Lee & Shepard. Pages, 116; illustrated. Price, $1.

Great Britain. Report of the Departmental Committee on the Use of Electricity in Mines. London, England; H. M. Stationery Office. Pages, 30.

Annual Report of the Comptroller of the Currency of the United States.. Volume II., 1903. Washington; Government Printing Office. Pages, 1,724.

Movement of the Population of the Empire of Japan. In the 33d Year of Meiji (1900). Prepared by the General Bureau of Statistics. Tokio, Japan; Public Printers. Pages, 356.

Alternating Currents. Their Generation, Distribution and Utilization. By Geo. T. Hanchett. New York; John Wiley & Sons. London; Chapman & Hall, Ltd. Pages, 180; illustrated. Price, $1, net.

Die Entwickelung des Niederrheinisch-Westfalischen Steinkohlen-Bergbaues in der zweiten Halfte des 19 Jahrhunderts. I. Geologie, Markscheidewesen. Prepared by Joint Committee of the Dortmund, the Westphalian and the Rhenish Westphalian Coal Unions. Berlin, Germany. Julius Springer. Pages, 316; with maps and illustrations. Price (in New York), $3.50.

Geologic Atlas of the United States, No. 94. *Brownsville-Connellsville. Folio. Pennsylvania.* Text pages, 20 and 12 maps. *No.* 96. *Olivet Folio, South Dakota.* Text pages, 8 and 4 maps. *No.* 97. *Parker Folio, South Dakota.* Text pages, 10 and 4 maps. *No.* 98. *Tichomingo Folio, Indian Territory.* Text pages, 8 and 4 maps. *No.* 99. *Mitchel! Folio, South Dakota.* Text pages, 8 and 3 maps. *No.* 100. *Alexandria Folio, South Dakota.* Text pages, 6 and 3 maps. Washington. Engraved and published by the United States Geological Survey.

BOOKS REVIEWED.

The Elements of Mining and Quarrying. By Sir C. Le Neve Foster. London; Charles Griffin & Company, Ltd. New York; THE ENGINEERING AND MINING JOURNAL. Pages, 324; illustrated. Price, $2.50.

This small book of 300 pages will meet with much favor among students, whether they be young or old. The author is the distinguished professor of mining at the Royal School of Mines, whose 'Textbook of Stone and Ore Mining' has already won for him a reputation as a clear expositor. The present treatise is—as he himself says in the Preface—a sort of guide-book to those about to set out in the systematic study of the art of mining; it explains the fundamental principles. while at the same time inciting the reader to further enquiry.

The first chapter consists of a compact but comprehensive outline of ore occurrence, and is followed closely by a second chapter, dealing with the discovery of ore-deposits. In these 38 pages there is compressed an amount of information such as elsewhere is scarcely to be found in 380 pages. Such is the character of the remainder of the book, which discusses successively Boring, Excavation, Timbering, Exploitation, Haulage, Drainage, Ventilation, Lighting, Dressing, Legislation and Accidents. The chapter on Support covers the main facts in timbering with a wealth of illustration and a terseness of description such as renders the 25 pages a perfect little essay on a most practical subject. Only one fault do we find—and it is one which marked Sir Clement's larger book—namely, the inclusion of a chapter on Ore Dressing. In the first place it is not a part of mining, but of metallurgy, and, in the second, it is not a subject which can be discussed profitably in a few pages; the author would have done better by utilizing the space for more matter on excavation and exploitation, contenting himself by affording judicious references to standard authorities upon processes of ore reduction. However, it can hardly be called a blemish on the book that it should afford information on matters scarcely included within its scope. It is an admirable treatise, no scrap-book or loose compilation such as are turned out wholesale nowadays, but an authoritative clear exposition by a writer possessing singularly happy powers of exposition.

The book is admirably illustrated and printed with all the excellence that characterizes the publications of Messrs. Griffin & Company.

Storage Battery Engineering. By Lamar Lyndon. New York, 1903; McGraw Publishing Company. Pages, 382; illustrated. Price, $2.50.

The great progress in recent years in the use of the storage battery has created a demand for a work that would cover the whole field from both a practical and scientific standpoint. The present work, while written with the practical side prominently in view, will be recognized as the most comprehensive treatise on the storage battery available in literature. To make it serviceable to a wide circle of readers the author has avoided as much as possible complicated mathematical formulas and discussions of a chemical nature, so that the text can be readily followed by those who are not thoroughly familiar with these sciences. It may be noted that the recent developments in the storage battery, which have aroused general interest, are not discussed—an unfortunate omission, perhaps, although they have not been thoroughly tested and their practical value is yet to be established.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Letters should be addressed to the EDITOR.

We do not hold ourselves responsible for the opinions expressed by correspondents.

Texas Oil.

Sir.—In reference to my letter, 'A Texas Oil Discovery,' appearing in your issue of February 4, "over an area of about 359 sq. m." should read "over an area of about 3.59 miles." Dr. Wm. B. Phillips has written to me, protesting against the reference made to our State geologist, stating that "he is now satisfied as to their natural origin." In a letter from Dr. Wm. B. Phillips to me, dated December 14, 1903, he says: "I note in your letter of November 25 that you obtained these

oils yourself from the ground, and this is, of course, entirely satisfactory to me." The gentleman writes me that the above statement does not say that he is satisfied as to the natural origin of the oils, as he has not examined the locality and has no personal observations to back up an opinion, and must therefore reserve judgment. Having in view the explanation of the meaning of the professor's letter, I wish to state that I consider the protest timely and just. JAS. SPICER.

Kerrville, Tex., Feb. 15, 1904.

The Ground Sluice Decision in California.

Sir.—Some operators seem to be uneasy touching the scope of the decision of the Supreme Court of California in the case of Yuba county v. Kate Hayes Mining Company, filed in December last. (74 *Pacific Reporter* 1049.) They scent danger to the entire mining industry of the State from the fact that in that case the court sustained an injunction against mining by the 'ground sluice processes.' Their fears are needless. The court did not extend the doctrine of Woodruff v. North Bloomfield, etc., known as the "Mining Debris Case," (9 Sawyer, 441, 18 *Federal Reporter* 753), and mining industries conducted on the watersheds of the Sacramento and San Joaquin rivers are in no greater danger now, than they were after the filing of the decree in the Mining Debris case. In that case the defendants were using large heads of water for mining by the hydraulic process, and were discharging their tailings into the tributaries of the Sacramento river, whereby, as the court found, the river had already become so silted up as to endanger the fertile agricultural lands of the plains, and whereby navigation of the river and of San Pablo bay and San Francisco bay had been impeded. In the Kate Hayes case the defendants were using large heads of water (2,500 inches) for mining by the ground sluice process, by which, as disclosed by the evidence, great quantities of tailings were carried into the tributaries of the Yuba river, where, for the same reasons as those obtaining in the Mining Debris case, they became a continuing menace to valuable property. For instance, at Marysville, the Yuba river has already been silted up more than 30 ft. above its original bed from mine tailings. In places on the water front of that city, the bed of the river is now above the level of the streets. The entire city is enclosed by a levee that in places is upwards of 20 ft. high. Thousands of acres of fertile bottom land have been destroyed—covered from 15 to 20 ft. deep with silt. In the early fifties steamers came up the river as far as Marysville; now only light-draft barges can come so far.

Nevertheless, mining is recognized as one of the great industries of the State, and, properly conducted, is in no danger. There is no virtue in a mere phrase. Ground sluicing, now-a-days, is not the ground sluicing of '49 and the spring of '50. The few buckets of water, or the mountain brook then employed have at this day acquired the volume and carrying power of a river—quite as capable, when laden with silt, of filling streams as though the process were hydraulic.

In the Kate Hayes case the court finds that the ground sluice process (as shown in that case) "produced the same effect in kind as the hydraulic process, only to a less degree." The gravamen of the action was, as it must be in every such case, that material injury had been done and was threatened.

I repeat, therefore, that mining on the watersheds of the Sacramento river—to which the Yuba, Bear, Feather, American and Mokelumne rivers are tributary—and upon the watersheds of the San Joaquin river—to which the Calaveras, Stanislaus, Tuolumne and Merced rivers are tributary—stands in no greater danger from injunction now than it has at any time since the entry of the decree in the Mining Debris case. Now, as then, the courts would take cognizance only of material injury.

It should be remembered that injunctions have never run against any process of mining, or against any mining upon the Klamath and Trinity rivers and their tributaries, and cannot, for the reason that neither of those rivers are navigable, that there are no agricultural lands on their borders capable of being injured, and that both streams are so torrential in character that the major portion of the silt is carried out to sea where it does no harm. Mining by the ground sluice process and the hydraulic process has been conducted there on a large scale, without hindrance, since the early days of mining. Probably the most important hydraulic mining operations in the State are being conducted there now.

In conclusion, my office here is that of a conservative mining lawyer, to make a plain statement of the facts, and thus turn the tide of pessimism. The mining industry of California stands in no danger from the courts.

EDWARD A. BELCHER.

San Francisco, Feb. 20, 1904.

ABSTRACTS OF OFFICIAL REPORTS

Tennessee Copper Company.

The company operates an extensive copper property in the Ducktown district of Tennessee. The report covers the calendar year 1903. The financial statement shows that the gross profits for the year from copper amounted to $415,537, from other sources $84,883, or a total of $500,420. From this interest and discount on bonds absorbed $32,500, and $50,355 was charged to depreciation account, leaving a net profit of $417,565 for the year. The balance of profit from 1903 was $299,335, or a total of $716,900. From this sum dividends Nos. 1 and 2 have been paid, each of $218,750, the latter one being paid in January of this year. The sum of $61,786 was expended on construction during the year and charged to equipment accounts, most of it being for the third furnace and accessories.

The average selling price of refined copper was 12.98c. per lb., which included a considerable proportion of 1902 product sold at low prices prevailing at beginning of the year. The cost of refined copper at the works was 8.20c. per lb.; freight and eastern expenses 0.96c.; making the cost of refined copper sold 9.16c. per lb. without taking credits for the miscellaneous receipts of $85,000 from iron ore, tolls and merchandise department.

The high price of coke during 1903 increased costs 0.38c. per lb. over those of 1902. The 1904 prices of coke are now less than either 1902 or 1903. The total operating cost of treating one ton of ore, including freight and eastern expenses, was $3.45. The balance sheet is as follows:

Mining property at cost, including preliminary development	$3,611,968
Treasury stock	625,000
Bond issue discount account	63,750
Equipment	950,346
Stocks and ore in process	323,690
Copper on hand	102,743
Accounts receivable	87,983
Collateral loans	312,500
Reserve account, loaned against collateral	37,500
Cash	21,930
Total assets	$6,137,410
Capital stock	$5,000,000
Mortgage bonds, 5 per cent	500,000
Depreciation account	83,000
Sundry creditors	56,260
Profit and loss	498,150
Total liabilities	$6,137,410

There were mined during the year 287,465 tons of ore, of which 284,202 tons were smelted, producing 10,690,389 lb. fine copper, mostly as ingot, showing an extraction of 37.615 lb. per ton of ore or a little less than 2 per cent yield.

The ore reserves January 1st, 1904, amount to 2,775,000 tons; an increase of 725,000 tons during the year, in addition to the 290,000 tons mined.

During 1904, three furnaces will be in operation most of the time, and, during the latter half of the year, at least two will be smelting green instead of roasted ore at an estimated saving of at least 1c. per lb. in cost. It is expected that the product for 1904 will be about 14,000,000 lb. copper.

On account of the large ore reserve, the directorate have decided to double the smelting plant and put in three more furnaces, or a total of six. The cost of this extension will be partially met by the unlocking of $170,000 tied up in ore on roast-yards, to be made available by changing to green ore smelting, the balance to be provided for from current earnings, the enlarged plant to be finished by July, 1905.

Lehigh Coal & Navigation Company.

This company owns a large coal estate in the anthracite region in Pennsylvania; it also owns the Lehigh & Susquehanna railroad, which it leases to the Central Railroad Company of New Jersey. The company also owns the Lehigh and the Delaware Division canals. The report is for the year ending December 31, 1903.

The coal tonnage of the Lehigh & Susquehanna Railroad and the Lehigh Canal is reported as below, in long tons:

Received from:	1902.	1903.		Changes.
Wyoming Region	2,372,973	4,977,643	I.	2,604,670
Upper Lehigh	154,788	247,988	I.	93,200
Beaver Meadow	343,956	611,384	I.	267,428
Beaver Brook	41,233	78,300	I.	37,067
Mauch Chunk	931,841	1,660,389	I.	728,548
Penn Haven	25,359	13,893	D.	11,466
Schuylkill	76,020	62,226	D.	13,794
Total	3,946,170	7,651,823	I.	3,705,653
Delivered to:				
Above Mauch Chunk	236,144	389,890	I.	153,746
East of Mauch Chunk, rail	3,710,026	7,186,523	I.	3,476,497
East of Mauch Chunk, canal	.....	75,410	I.	75,410
Totals	3,946,170	7,651,823	I.	3,705,653

The total earnings of the Lehigh & Susquehanna, as reported by the lessee, were $7,719,667, the largest ever made by the road. The rental received was the maximum amount payable under the terms of the lease.

The financial statement shows that the revenues from Lehigh coal lands for the year were $730,033; rental of Lehigh & Susquehanna railroad, $2,170,777; from other railroads, $73,484; miscellaneous, $203,879. The loss on the operation of the canals was $69,039, so that the gross earnings for the year were $3,109,134. The working expenses of all kinds,

taxes and interest paid, amounted to $1,397,550; depreciation on improvements, $100,000; sinking funds of 5c. per ton on coal mined, $100,381; making a total of $1,597,932, and leaving a net balance for the year of $1,511,202. From this there were paid dividends amounting to $3 per share, or 6 per cent on stock, requiring $946,329 and leaving a balance of $564,873 to credit of profit and loss for the year.

The production of coal from the company's lands was the largest in the history of the company. The details of production were as follows, in long tons:

	1902.	1903.	Changes.
Coal sold.....	972,712	2,007,630	I. 1,034,918
Used by company..	139,415	186,489	I. 47,074
Total mined....1,112,127		2,194,119	I. 1,081,992
Per cent used by Co.	12.5	8.5	D. 4.0
Days worked.....	127	254	I. 127
Tons mined per day	7,581	7,598	I. 17
Av. cost per ton...	$1.854	$1.734	D. $0.120

The year 1902 was, of course, an exceptional one, owing to the strike. Comparing 1903 with 1901, a normal year, there was an increase in coal mined of 288,624 tons.

The cost of mining at the collieries owned by the company, based on the production of all sizes, exclusive of the coal used by the company in its mining operations, and including, in addition to the regular mining expenses, all charges for extraordinary improvements, consisting of one new breaker completed, work on three new shafts, expenses in extinguishing fires, constructing water-storage reservoirs and coal-dirt dams, etc., was $1.861 per ton. The increase in cost of mining is due to higher wages paid, and would have been much greater except for the reduction in cost due to largely increased production.

The proportion of the domestic sizes—chestnut and over—and of the small, or steam, sizes produced at the company's collieries, was as follows:

	1902.	1903.	Changes.
Large sizes 52.07		50.58	D. 1.49
Pea 13.77		13.93	I. 0.16
No. 1 buckwheat.....12.36		13.56	I. 1.20
No. 2 buckwheat.....21.80		21.93	I. 0.13
Total steam sizes.....47.93		49.42	I. 1.49

Owing to the heavy freshets of 1902, it was impossible to open the canals until May 26, 1903, and the fall business was stopped by the high water in the Delaware on October 10. The season was therefore very short. The business of the canals amounted to 127,821 tons, against 345,197 tons in 1901; in 1902 there was no business on the canal.

The president's report says: "Nine collieries were in operation during the year. The shipments from No. 4 and No. 6 were considerably interfered with by mine fires, which developed underground, causing a loss of working time and reducing the output at least 65,000 tons. The fire at No. 4 colliery was extinguished without having to drown out the workings. At No. 6 colliery the fire was so located that it was impossible to attack it successfully, making it necessary to flood the mine, which was done, and the fire was entirely extinguished and work resumed in December last. On October 7 the water began to accumulate in the shaft, and the water from the creek was turned in on the surface. Twenty days from that time the shaft was filled to the water level, a vertical distance of 403 ft., where it was allowed to stand for 15 days, when the machinery was started to hoist it out of the shaft. The engines used for hoisting water and coal were both utilized, and the four compartments of the shaft were fitted with water tanks. From the time we began to hoist until December 6, when the water was removed, the machinery was kept in constant motion for a period of 25 days. The average amount of water hoisted per day of 24 hours was equal to 15,710 tons, the best day's record being on December 3, when 22,710 tons were hoisted, which was at the rate of 4,256 gallons per minute. The total amount of water hoisted was about 106,000,000 gallons.

"The new breaker at No. 5 colliery was completed during the year, and is now in successful operation. During the coming year it is proposed to rebuild the breaker at No. 10 colliery, as the present structure is too old and antiquated to answer the purposes for which it was designed.

"During the past year your board of managers made a lease to the Maryd Coal Company, giving them the right to mine and ship coal, under royalty, on the land belonging to the company west of Tamaqua, known as the Kentucky Bank and Reber tracts, containing about 883 acres. No coal has been mined from this property heretofore, except in a small way above water level. Your tenants are now actively engaged in developing the property on a large scale by sinking deep shafts and preparing to build a large breaker. This operation should, in the near future, produce a large amount of coal, and be a source of considerable revenue to the company."

QUESTIONS AND ANSWERS.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc.; preference will be given to topics which seem to be of interest to others besides the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

Sand-Lime Brick.—I am anxious to get some information about sand-lime brick, especially in regard to their durability and the process of manufacture.—E. E. S.

Answer.—Sand-lime brick, which are manufactured on a large scale in Germany for building purposes, are made of sand and sufficient lime to bind the sand particles together. The sand must be clean and sharp and the lime of good quality. Before mixing, the lime is thoroughly pulverized in a ball or other mill, and is then slacked, or according to another method, the slacking may be done after the materials have passed through a mixer. The latter method is generally considered preferable, as the heat generated during the slacking promotes the chemical union between the sand and lime, which is a necessary feature. From the mixing machine the mortar is charged into a press, which moulds it into bricks of the required shape. The bricks are then piled on cars and run into the "hardening boiler"—a long cylinder of boiler iron, with one end fitted with a lid, or door, which swings on hinges—where they are subjected to several hours' treatment under a steam pressure of from 130 to 150 lb. After removal from the boiler and cooling they are ready for the market.

The manufacture of sand-lime brick is a comparatively new industry, and the material, therefore, has not been thoroughly tested under actual conditions of service. But numerous experiments have been carried out, which indicate that the brick fulfill all requirements as regards durability that are exacted of ordinary brick and building stone. The material has been used to some extent in the construction of public buildings in Germany.

Repairing Steel Tape.—With reference to the question under this head, published in our issue for February 11, Mr. Frank Robbins, of Los Angeles, Cal., sends us the following: "Mr. Harry Browne, our surveyor at the North Star mine, was full of rough, ingenious expedients. We had a long, steel ribbon-tape which met with frequent misadventures. Browne's method of repair was this: He would roughly notch the edges of the broken tape with a chisel, or file, and then enclose these, with the broken ends joined, in a piece of very thin tin-plate—usually the air-cover of a tin of Wills' tobacco; he then hammered the yielding tin into the notches in the tape with the chisel or file. These unions seemed perfect as far as strength was concerned. When he had time and wished to make an especially good job he would close the fold in the plate with solder, though this had no effect upon the strength of the joint. The accompanying sketch will explain the *modus operandi*.

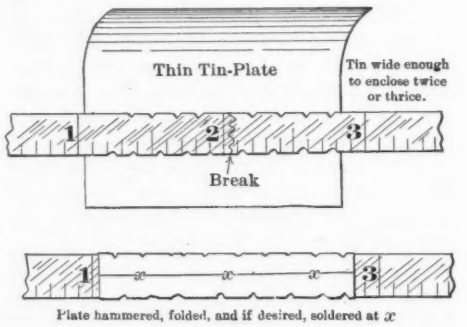


Plate hammered, folded, and if desired, soldered at *x*

"I may add that several instrument manufacturers advertise sleeves for broken tapes, which can be slipped over the break and soldered simply by heating. A coupling or splice is advertised by the Alexander Company, of Clearfield, Pa., which seems to me to be excellent for use in the field, although I have never tried it myself."

Mr. T. P. Bowman, of Picacho, Cal., sends us another method: "The following I have found to be a very good method for repairing broken steel tapes. Take a piece of sheet brass, thick enough to be fairly rigid, but not so thick but that it may be bent around the tape readily, and tin one side with solder. Cut from this brass a piece an inch long and wide enough to go around the tape without lapping, having the edges meet as nearly as possible and the brass still fit the tape as closely as possible; the tin side being next to the tape. The ends of the tape to be joined are now cleaned with a file or piece of sandpaper, and inserted in the brass sleeve and the sleeve compressed tightly on the tape. The joint is now held over an alcohol lamp or a hot iron held on it until the solder melts and them allowed to cool, and the tape is ready for use. I have found a soldering paste made by the Highland Electro-Chemical Manufacturing Company, Connellsville. Pa., to be very good to use in connection with this work."

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALLY REPORTED.

LOCATING SALT DEPOSITS.—In answer to several inquiries on this subject, it may be stated an act of Congress, passed January 31, 1901, provides that "All unoccupied lands of the United States containing salt springs, or deposits of salt in any form, and chiefly valuable therefor, are declared to be subject to location and purchase, under the provisions of the law relating to placer mining claims; provided that the same person shall not locate or enter more than one claim under this act."

Regarding this act, Lindley—'American Law Relating to Mines and Mineral Lands,' sections 514a, 515, says: "Except in such States as Utah, to which all salt lands therein have been previously ceded, the general mining laws applicable to the discovery and location of placers apply, with one marked exception, that the same person may not locate nor enter more than one claim, thus placing the location of salt lands in this behalf on the same plane with coal and homestead entries. The right to locate is exhausted by the entry of an individual claim. The rules in this regard with reference to coal land apply to analogy to some extent at least.

"This act would from its phraseology seem to be operative in the States which have heretofore been excepted from the operation of the general mining laws—Michigan, Minnesota, Wisconsin, Missouri, Kansas and Alabama. In other words, the general mining laws, so far as they are applicable to the appropriation of saline lands, are in force in all the public land States and the continental territories enumerated in a previous section, wherein there are unoccupied public lands of the United States containing salt springs or deposits of salt in any form.

"Deposits of rock salt fall within the designation of salines, as do salt springs and salt beds, although Commissioner McFarland entertained the view that a ledge of rock salt might be located under the lode laws.

"This, we think, would now be the rule were it not for the express language of the statute, which provides for the location of salt deposits under the provision of the law applicable to placers."

PATENTS RELATING TO MINING AND METALLURGY.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by the ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week Ending February 23, 1904.

752,638. MINER'S CHECK-HOLDER.—Dennis P. Adams, Huntington, W. Va. A miner's check-holder; comprising a receiver having a throat for the insertion of the check, means for locking the check within the said receiver, said means being automatically released when the car to which the holder is attached is tipped.

752,667. GEODETICAL INSTRUMENT.—Howard Grubb, Dublin, Ireland. In a geodetical instrument, the combination with the geodetical instrument proper, of a sight and means for rendering luminous rays proceeding therefrom parallel to one another and producing a virtual image of the sight that can be projected on the object being viewed and observed simultaneously therewith while the instrument is being used to make a measurement.

752,677. PROCESS OF MAKING SULPHURIC ACID.—Nicholas Heinz and Herman Hegeler, Lasalle, Ill. An improvement upon the Glover process for the manufacture of sulphuric acid which consists in returning nitrogen compounds from any part of the system and introducing and mixing them with the sulphurous gases entering the Glover tower.

752,702. SEPARATING-HOPPER FOR STAMP-MILL LAUNDERS.—Frederick W. O'Neil, Painesdale, Mich. In a separator of the class described, a receiving-basin having an orifice through its bottom, a hollow leg mounted beneath said basin, means for closing said leg, a valve for closing communication between said leg and basin, and a water-supply pipe between said basin and said valve.

752,709. MACHINE FOR EXCAVATING, RAISING, SCREENING AND FILLING GRAVEL BALLAST, ETC.—Hilary Quertier, Dunedin, New Zealand. In a machine for excavating and raising gravel ballast and the like, in combination, a traveling truck, a base-plate thereon rotating about a king-bolt, a tumbler-frame upon the base-plate, a bucket-ladder carrying. buckets moving upon the frame, means for driving the same and also winch-drums, a head-line that is wound upon one of the drums and bowlines upon other drums the outer ends of the lines being attached to anchors suitably situated so that when either of the bowlines is inwound the base-plate and superstructure may be swung round a complete circle if need be.

752,715. PUMPING APPARATUS. — James E. Smith, Alamogordo, N. Mex. A pumping apparatus, comprising a supporting-frame having a cylinder associated therewith, two plungers disposed for alternate movement in said cylinder, a driver-shaft carried by said frame and having spaced gears eccentric thereto and oppositely disposed thereon, counter-shafts upon opposite sides of said driver-shaft and carrying gears having crank-pins and eccentric to their shafts and interengaging said eccentric gears upon said driver-shaft, and connecting means between said crank-pins and plunger-rods, whereby the operative strokes of said plungers will be at a slower speed and with increased force.

752,726. ORE-AGGLUTINIZING APPARATUS.—Edward A. Uehling, Passaic, N. J. In an ore-agglutinizing apparatus, the combination of two co-operating rolls, means for rotating said rolls, means for feeding ore to said rolls and means for feeding slag to said rolls, together with means for regulating the supply of said ore and said slag.

752,743. ROLLING-MILL. — Raymond D. York, Portsmouth, Ohio. In a rolling-mill the combination with top and bottom rolls, of means for producing a relative adjustment between the top and bottom rolls, a side roll, means for moving the side roll outwardly and inwardly transversely to the plane of relative adjustment between the top and bottom rolls, a bearing-block for said side roll and means mounted independently of the top and bottom rolls and co-operating directly with said block for raising and lowering the said roll.

752,819. ROCK-DRILLING MACHINE. — Sanford W. Brothers, Denver, Colo. In a rock-driling machine, the combination with the casing and a reciprocating piston therein, of a drill-holding chuck, and means for connecting the piston and chuck whereby they rotate together, but have independent longitudinal movement, said means comprising detachable keys mounted in seats formed in the chuck and engaging seats or grooves formed in the piston.

752,838. CONVEYOR.—John A. Heintz, Chenoa, Ill. In a device of the class described, an elevator, a conveyor-trough having one end disposed beneath the discharge of said elevator, an endless carrier in said conveyor-trough, a guard pivotally connected with the hood of the elevator, and means for manipulating said guard.

752,848. ORE OR GRAIN CHUTE.—Charles A. Moffett and Franklin B. Keiser, Birmingham, Ala. A chute comprising a hopper, the rear wall of which forms the bottom of the chute, detachable side walls carried by the hopper, a cut-off gate pivotally carried by said side walls and adapted when lowered to open the chute and form a combination of same and when raised to close the chute.

752,887. BRICK-MACHINE.—Thomas S. Crapp and Robert C. Finch, Indianapolis, Ind., assignors to Frank Glessner, Shelbyville, Ind. In a machine for pressing brick, a press-box a pug-mill discharging therein, molds moving in a tranverse vertical plane across the discharge end of said press-box, a hollow revoluble shaft, a piston-rod passing through the hollow shaft, means for intermittently reciprocating the piston-rod and a plunger mounted in said press-box on said piston-rod.

752,904. APPARATUS FOR HANDLING COKE.—Charles W. Hunt, West New Brighton, N. Y. The combination of a bench of retorts, a floor having an opening through which the coke discharged from the retorts may fall, a cover for said opening, a chamber beneath said opening, and below the floor, and means to withdraw the steam from said chamber as the coke is quenched.

752,907. TAPPET FOR THE SHAFTS OF ORE STAMP-MILLS, ETC.—Philip C. Kelly, Sandycroft, England, assignor to the Sandycroft Foundry Company, Ltd., Sandycroft, England. A tappet formed of two sections, the larger having a longitudinal gap at least equal to the diameter of the shaft to which it is to be secured and the smaller section forming the gate being of a size to fit said gap and having a surface shaped to fit the shaft and means carried by said gate-section for forcing and holding it directly against the shaft.

752,913; 752,914 and 752,915. PLATE-HANDLING MACHINE.—Edmund Miles, Cleveland, Ohio, assignor of one-half to S. L. Selleck, Cleveland, Ohio. In a plate-handling machine, the combination with a movable plate-receiving member, of means for moving said member to effect the transfer of the plate carried thereby, and a trigger controlling the operation of said means, said trigger being disposed to be held in one opsition by a plate passing to the member and released by said plate when the latter has been entirely received by said member.

752,926. RECIPROCATORY GOLD-SEPARATOR.—John P. Schmitz, San Francisco, Cal. An improved gold separator, comprising a flat smooth table inclined in the direction of its length, and having stops or abutments along its sides; an inclined trough of equal diameter throughout and consisting of segmental sections abutting endwise, each of said sections having a flange at one end which projects both above and below the bottom of the section and a flange at the opposite end which projects below only, each of said outwardly-extending flanges forming rockers for the section; transversely-disposed stops on the table engaged by said rockers to prevent end movement of the trough; packing-strips between abutting-sections; means for oscillating the trough; and lugs on the outer sides of said trough and adapted to contact with said abutments at the end only of each transverse oscillation of the trough.

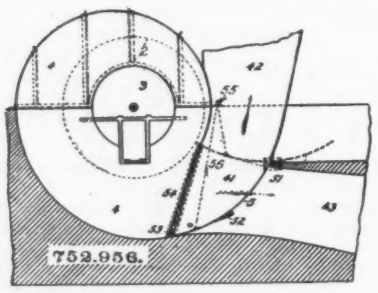
752,927. PROCESS OF PREPARING ALUMINUM SULPHATE.—Heinrich F. D. Schwahn, St. Louis, Mo. A method of purifying aluminous materials containing iron, which consists in subjecting them in the raw state to the action of a chloridizing agent to convert the iron into ferric-chloride, and then heating the mass to a temperature above the volatilizing point of ferric chloride, but below the point at which aluminum compounds become insoluble.

752,945. ROCK BREAKER AND PULVERIZER.—Drury D. Bailey and James O. Bailey, Banner, Cal. A crusher and pulverizer consisting of a shell, the upper portion of which is cylindrical, the lower portion convergent, a crusher consisting of an upper cone divergent downwardly and a lower cone convergent downwardly, the bases of said cones being continguous, a feed-chute connecting with the cylindrical portion of the shell at a point below the top thereof, a step and a spindle forming a journal for the lower cone, and a cap within which the upper end of the upper cone is turnable, and screws by which the step and cap are vertically adjustable.

752,955. MINE-VENTILATION SYSTEM AND APPARATUS.—William Clifford, Jeannette, Pa. In a mine having a plurality of entries, a drift or drifts connecting the entries, and a drift connecting one of the entries with the open air, the combination of a fan adapted to impel a current of air through the mine, and movable doors placed at the points of communication between the entries and drifts, adapted when in one position to allow the current to circulate through the mine in one direction and when in another position to allow the current to circulate in another direction and out through the drift to the open air.

752,956. VENTILATING-FAN STRUCTURE.—William Clifford, Jeannette, Pa. In a centrifugal-fan construction, a delivery-chamber, a chimney-

passage, and a blowing-passage, in combination with a door adapted to control said passages, and a support for said door, the said door being movable laterally and longitudinally on its support.



752,972. CHUCK FOR ROCK-DRILLING MACHINES.—James Hodge, Witwatersrand Gold Fields, Transvaal. In a rock-drill chuck a head or body constructed in two parts longitudinally, the one part being provided with a projection and the other part with a corresponding groove or recess to receive said projection, in such manner that the two parts of the head may be expanded to receive the shank of the drill, and means for compressing the two parts of the head to secure the drill.

752,980. MACHINERY FOR THE MANUFACTURE OF METALLIC TUBES, ETC.—William U. Jackson, Heath Town, and Francis H. Lloyd, Lichfield, England. The combination of two pairs of rolls, and a mandrel operative in connection with each pair of rolls, the said pairs of rolls being arranged end to end and being rotative in opposite directions, each pair of rolls having a series of gradually-diminishing eyes or grooves, the eyes or grooves of one pair of rolls alternating in size with the eyes or grooves of the other pair, thereby to permit a series or cycle of rolling operations to be conducted by the two pairs of rolls on a tube or billet to be treated thereby, combined with a pair of traveling tables, one at each side of the rolls, the tables being arranged to travel backward and forward simultaneously.

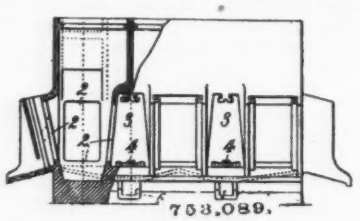
753,015. COMPRESSOMETER.—William J. Tretch, Philadelphia, Pa., assignor to Frederick A. Riehle, Philadelphia, Pa. A compressometer including compression-blocks adapted to receive between them a test-piece, a gauge operatively connected to said compression-blocks to measure the reduction of distance between them and a portion on which one of said blocks bears, said portion and said block having the one a convex and the other a concave surface.

753,045. METHOD OF OBTAINING GAS FROM WELLS.—Augustus S. Cooper, Oakland, Cal. A method of obtaining gas from wells containing water with gas held in solution, which consists in lifting said water in the well by means of a hydrocarbon gas introduced under pressure into the water column below, and collecting the gas liberated from said lifted water.

753,048. MINER'S TOOL.—Alfred V. Des Moineaux, Silverplume, Colo., assignor of three-fourths to Helen Des Moineaux, Silverplume, Colo. A miner's tool having handles provided with slitting-blades adapted to shear past one another, and a guide-cap carried by one blade and having an open side presented to the other blade, said cap presenting opposing spaced members between which a fuse may be inserted and into which one of the blades is adapted to be received.

753,076. GATE FOR ORE-POCKETS OR SIMILAR RECEPTACLES.—Frank K. Hoover and Arthur J. Mason, Chicago, Ill. The combination with a pocket or hopper having a discharge-roller mounted across its discharging end, of a pivoted gate in the nature of a guard mounted above and parallel with the discharging-surface of said roller, and controlling means connected with the pivot of said gate serving to hold the latter stationary in both its fully open and closed positions, but permitting the gate to pass from closed to open position under the impact of the material thereagainst when the roller is operated.

753,089. MULTIPLE-STAMP MORTAR.—William A. Merralls, San Francisco, Cal. A mortar having a plurality of chambers for stamps, each chamber having four discharge-openings on the four sides, the chambers being spaced from each other, and the mortar being provided in said spaces between said chambers with channels for the pulp inclined downward from the rear to the front, said mortar also having lower channels immediately below the aforesaid channels, leading from the rear to the front and having a trough at the rear of the chamber, said trough having surfaces inclined downward and meeting at points immediately behind the lower channels and discharging thereinto.



753,092. MACHINERY FOR CONTINUOUSLY CUTTING COAL.—Hubert V. Neukirch, Zwickau, Germany. In machinery for cutting coal, the combination with temporary posts in the side tunnels and upper and lower guide-pulleys carried thereby, of pulleys in the rear of said guide-pulleys, an endless belt of rope carrying cutters, passing over the upper guide-pulleys and across the breast on the level of the top of said upper pulleys, under the lower guide-pulleys and across the breast on the level of the bottom of said lower pulleys, and around the rear pulleys, and suitable driving and feeding means whereby the cutter-rope makes two cuts across the breast at the same time.

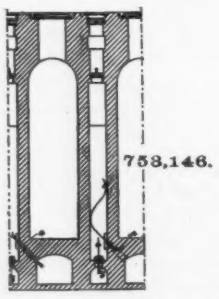
753,102. COAL-CHUTE DEVICE.—Staunton B. Peck, Chicago, Ill., asignor to Link Belt Machinery Company, Chicago, Ill. In a coal-chute device, the combination of a discharge-way with forwardly-projecting exterior parts, a lid which lies upon these parts and a chute adapted to receive coal from the way.

753,121. CUPEL-MAKING MACHINE.—Albert C. Calkins, Los Angeles, Cal., assignor to the Calkins Company, Los Angeles, Cal. A cupel-making machine, comprising a main frame, a feed-hopper, a reciprocating plunger mounted on the main frame, a two-part mold swingable alternately under the hopper and plunger, and comprising an upper member having a vertical aperture or cell, a lower solid body that forms a false bottom for the said cell, the said upper and lower portions having interengaging members, whereby the two can be moved in unison, and means for supporting the said upper and lower members for movement independent of each other, and means for imparting a compressing movement to the plunger.

753,122. MELTING-FURNACE.—Henri J. J. Charlier, Philadelphia, Pa. The combination of the body of the furnace having at one end an opening for receiving the products of combustion, with a charging-hopper, through which the products of combustion escape from the furnace, said charging-hopper being located adjacent to that end of the furnace which receives the products of combustion, whereby a reverberating effect of the latter within the body of the furnace is obtained.

753,142. MACHINE FOR DISCHARGING COKE FROM OVENS.—Joseph Kershgens, Charleroi, Pa. In a machine for discharging coke from ovens, the combination with a supporting-frame, of a push-bar arranged for reciprocation on said frame and adapted to be projected from the side of the frame, means for projecting said push-bar normally disengaged from the push-bar, and separate means for imparting initial movement to the push-bar to bring it into engagement with said projecting means.

753,146. COKE OVEN.—Heinrich Koppers, Essen-on-the-Ruhr, Germany. A coke oven comprising in combination with the usual coking-chambers and the heating-flues, provided with nozzles at the bottom for the admission of a vertically-ascending gas-column, inclined channels connecting the air-conduits with the base part of the heating-flues, the inclination being out of line with the ascending gas-column in order to leave it undisturbed, and to circulate around it.



753,154. CENTRIFUGAL PUMP.—Luther Look, Los Angeles, Cal., assignor to New Standard Concentrator Company, Los Angeles, Cal. A centrifugal pump comprising an oblate spheroidal chamber having an axial inlet on one side and an outlet on the other side; a disk to revolve in the chamber and provided on the inlet side with an axially-arranged cone and radiating wings which are, respectively, sections of a hollow cylindroid, the chords of said wings being at an angle with the plane of rotation.

753,159. VALVE FOR BLOWING-ENGINES.—Alexander K. Rarig, Columbus, Ohio. In a blowing-engine, the combination with the valve between the compression-cylinder and the receiver and the positively-acting valve-gear therefor; of a yielding connection between the valve and its gear, a pressure-actuated valve-balancing piston connected with the valve, and means communicating pressure to the valve-balancing piston from the compression-cylinder.

753,165. MINER'S CANDLESTICK.—Richard H. Rusden, Rossland, Canada. A miner's candlestick having its prod and handle formed of a single piece of material with parallel members, a hook secured to said prod between said parallel members and projecting at an angle thereto, a thimble sleeved upon the prod and having a portion engaging the end of the shorter of said members, and a nut on said prod bearing against said end of the thimble.

753,203. BIT FOR COAL-MINING MACHINES.—Robert McKinney, Hays Borough, Pa., assignor of one-half to Thomas M. Gibbs, Canonsburg, Pa. A cutter device comprising a chain, three bits which are adapted to be secured in said chain, said bit comprising a shank and angle portion, the angled portion of each bit having its front and rear faces tapered toward an edge, one of said bits having its sides tapered toward the rear face and toward the outer extremity, said outer extremity being beveled from the front to the rear face and the other two having one side tapered toward the extremity.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

Week Ending February 6, 1904.

501 of 1903. COAL BRIQUETTES.—A Custodis, Düsseldorf, Germany. Making small coal into briquettes by means of an admixture of ferruginous flue dust, and by compressing, the briquettes being used in the manufacture of hard coke for the blast furnace.

2,036 of 1903. LIXIVIATING COPPER PYRITES.—G. Gin, Paris, France. Lixiviating roasted cupriferous pyrites with a solution of sulphurous acid, heating to precipitate the iron and decompose the cupross cupric sulphite, part of the copper being thus precipitated, while the remaining solution of cupric sulphate is cemented.

3,470 of 1903. EXTRACTING GOLD FROM SEA WATER.—W. L. Peat, Portsmouth. In extracting gold from sea water, passing the water through tanks containing mercury.

4,981 of 1903. MAKING MANGANESE STEEL.—R. A. Hadfield, Sheffield. Improvements in toughening manganese steel, by first heating slowly to 750° or 800° C., then rapidly to 940° or 1125° C., then allowing to cool to 800° C., and again heating to 940° or 1150° C., after which it is quenched in cold water.

5,171 of 1903. COAL CUTTER.—G. G. M. Leichman, Denain, France. A coal cutter consisting of a rapidly revolving shaft carrying milling cutters at the end, the shaft being mounted so that it can travel along the face of the coal.

6,180 of 1903. PRODUCING PURE ALUMINA.—Societa Romana Solfati, Rome. An improved process of producing pure alumina from alum solutions by treating with carbonate of lime.

26,258 of 1903. ROCK DRILL.—M. Kuzel, Penzburg, Bavaria. A reciprocating rock drill with the support and rotating mechanism arranged in the same horizontal plane, so that they occupy the minimum vertical space, and the drill can be used for very thin seams.

26,578 of 1903. ROCK DRILL CHUCK.—J. Hodge and J. Bartle, Johannesburg, Transvaal. An improved chuck for rock drills.

SPECIAL CORRESPONDENCE.

Denver. Feb. 27.

(From Our Special Correspondent.)

At a banquet in Denver, on February 23, in honor of Governor Peabody, in recognition of the stand he has taken for law and order and the freedom of the individual citizen, as against the attempted tyranny of union labor, more than 700 people from every part of Colorado were present, including members of both the leading political parties, who joined in the ovation to Governor Peabody. In response to urgent appeals he has consented to be a candidate to succeed himself.

The conspiracy case of three prominent strike leaders—Parker, Foster and Davis, charged with attempting to wreck a train on the Florence & Cripple Creek railroad, is still on trial at Cripple Creek. On the closing of the case for the prosecution, Davis was discharged from custody, the court ordering a verdict of not guilty entered on the records. A motion was made by counsel for the defense that a verdict of not guilty be returned as to Parker and Foster, but was denied.

Owing to unforeseen developments the expected order terminating martial law in San Miguel county has been postponed, it is said, at the request of the sheriff. Many of the union miners who were deported are at Ouray, and have not yet gone to work.

It was announced by W. G. Smith that the Denver, North Western & Pacific railroad, better known as the Moffat railroad, will be completed for 100 miles (or beyond the main range) to Sulphur Springs, in Grand county, by September 1 next, and will be through Gore cañon and into Utah some time next year. Between Denver and Rollinsville, 42 miles west of Denver, the railroad passes through 31 tunnels, from 200 ft. to 1,700 ft. long, aggregating 2½ miles of tunnel work, 16 ft. by 23 ft. in dimensions. This section had greater engineering difficulties than any other part of the route. Pending the completion of the tunnel through the main range, 60 miles west of Denver, the line will be carried over the range by switchback.

Pyrite smelters, designed to handle low and medium grade gold-copper ores, are located at Golden, Leadville, Robinson, Buena Vista, Grand Junction, Ouray and Silverton, with an aggregate daily capacity of 2,000 tons of ore. For one reason or another, all these plants are at present idle, one reason given being the low price allowed at the refineries for copper matte.

San Francisco. Feb. 24.

(From Our Special Correspondent.)

Heavy rains continue throughout northern and central California dispelling all fear of a short season. Some damage has been done, as rivers are bank full. The most recent rains have been warm, and the snows are melting to some extent, thus drawing on the summer supply. In all the upper portion of California the placer and hydraulic men are running their claims on full time.

The Mountain Copper Co., of Keswick, Shasta county, is advertising that it will pay $2 per ton for quartz going over 95% silica. It is bought as a flux and not assayed. As a result numbers of low grade quartz properties are shipping to the smelter. The presence of the works has greatly encouraged owners of small mines, since they can get almost immediate returns for their ore and do not have to put up reduction works. Shasta county has thus become the best place in the State for miners of small means who want to work their own claims.

Up in Tehama county, between Roaring river, Bee Gum and Cottonwood creeks, is a new gold dredging field, the surface indications of which are quite promising. Mr. D. S. Cone has bonded an area five miles long and a mile wide, which he proposes to work by dredger. None of the dredging fields have as yet equalled Oroville, on the Feather river, where some 26 dredgers are at work with more building. Before the dredgers began work Oroville was a decadent mining town with about 1,800 population. Now over 3,500 people are there, and the town is more prosperous than even in the days of the rich placer mines. The present tendency is to build dredges large and strong. The average cost of the common type of dredge has been about $60,000, and the new ones cost over $80,000.

Orders have come from the East to start work again on the Pala lithia mines in San Diego county, where litigation stopped work for some time. It is understood that the orders are the result of the settlement of all claims adverse to the American Lithia & Chemical Co. San Diego county seems to be unique in its deposits of lithia-mica and gems. At Pala and Mesa Grande tourmaline kunzite, smoky topaz and rock crystals have been found, and new discoveries are announced in Moosa canyon, near Moosa falls, at Oceanside. Surface indications are about the same as at Pala and Mesa Grande.

The suit of the Great Western Mining Co. against J. J. Chambers is now on. Mr. Chambers says he is perfectly able to prove untrue the charges of fraud.

The South Eureka Mining Co., of Amador county, has lost its suit against Vandament and his heirs. Vandament had excepted the right to use the surface for farming, and on this land the South Eureka mine was developed. The directors of the company thought that on the death of Vandament his right to farm was lost, and a lawsuit ensued. The court now decides that his heirs continue to have ownership of the surface of the ranch. The company will keep busy.

Spokane. Feb. 26.

(From Our Special Correspondent.)

There is unusual prosperity in the Coeur d'Alenes, and at the mines 2,100 men are busy including 150 estimated to be developing prospects. It is estimated that the mine payroll is $200,000 a month, wages at Wardner being $3 for muckers and $3.50 for miners. At Cañon creek, near Wallace, the minimum pay is $3.50 for all men underground. Timbermen get $4. The Federal Mining & Smelting Co. works 900 men in its four mines and its mills. The Bunker Hill & Sullivan, with 425 names on the payroll, is the largest single mine. Of the Federal group, the Standard works 330 men, the Last Chance 225, the Mammoth 215 and the Tiger-Poorman 189. The Hecla employs 125 men, the Hercules 120, and the Goldhunter, the Monarch and the Snowstorm 20 each. On account of the scarcity of water, the Morning is working a reduced force.

Suit for $546,500 damages has been started by farmers along the Coeur d'Alene river, in Idaho, against the Empire-State-Idaho, the Federal, the Bunker Hill & Sullivan, the Hecla, the 'Frisco and the Goldhunter companies and Larson & Greenough, who own the Morning mine. The farmers claim that the lead concentrating mills along the river have poisoned the water; that the sediment left by the spring overflow is destructive to vegetation, and that the filling of the stream by tailings causes it to overflow on the slightest freshet.

Charles Crysler, promoter of the Northern Gold Mining Co. and other dredging enterprises at Delta, Idaho, reported arrested in New York under charges of fraud preferred by John W. Woodside, of Philadelphia, put three dredges on ground near Delta last year. Their success has been problematical.

The New Jersey Mining Co., of Spokane, operating the New Jersey group two miles above Wardner, Idaho, has closed its mine and mill after an unsatisfactory mill run. The plant was started as a new style electric plant, but was changed to more nearly a standard type.

Spokane men have organized the Calispell-Summit Mining Co., capital $2,000,000, to work the Conquest claim on the Pend d'Oreille river.

Lewis Larson has made another payment on the purchase price of stock in the Last Chance Mining Co., operating a galena property near Northport, Wash. Shipments are resumed.

Jay P. Graves, general manager of the Granby Consolidated Co., operating at Grand Forks, and Phoenix, B. C., reports that the smelter is treating 2,000 tons of ore a day. Work has started on the No. 4 tunnel of the Old Ironsides mine to open the 300-ft. level.

James Breen, of Spokane, who is interested in the Crofton, B. C., smelter, may build a smelter on Eholt creek to handle the ores of the Dominion Copper Co. It is also reported the Dominion group may be taken by the Montreal & Boston Co., owning the Boundary Falls, B. C., smelter.

Toronto. Feb. 26.

(From Our Special Correspondent.)

Local men are developing the newly-discovered silver and cobalt deposits, near Haileybury, on the line of the Temiskaming Railway, the ore of which is piled up ready for shipment when spring opens.

A fire on February 19 damaged the smelting works of the Canadian Copper Co., at Copper Cliff, Ont., to the extent of $150,000, and the staff of 1,100 men were temporarily thrown out of employment. The directors, at Toronto, on February 22, made arrangements by which the company could secure the use of the Mond smelter at Victoria Mines until the works were rebuilt. The new works will be rebuilt on an enlarged scale.

An order-in-council has just been passed by the Dominion government rescinding the regulations for the disposal of hydraulic mining locations in Yukon territory, which were adopted in December, 1898, and frequently amended. Mining will henceforward be carried on under placer regulations. Leases granted under the regulations are not interfered with.

The town of Collingwood, Ont., is applying to the Ontario legislature for an act modifying its former agreement with the Cramp Steel Co. On consideration of a $115,000 bonus the company undertook to erect smelting works and steel furnace, to be in operation July 1 next. The steel plant is ready, at a cost of $400,000, but the company seeks to be relieved of putting up a smelter now, as it does not wish to be restricted as to time. The town is willing to relieve it of the obligation on condition of the bonus being reduced to $60,000.

At the annual meeting of the National Portland Cement Co., Ltd., operating near Durham, in Grey county, Ont., the financial report showed a net loss of $10,087 on the year's business. The liabilities are $1,161,561 and the assets $86,936 less. The total receipts were $271,597.

Westinghouse, Church, Kerr & Co. have been granted a provincial license to carry on business as mechanical engineers, etc.

Victoria. Feb. 23.

(From Our Special Correspondent.)

Coast Districts.—The output of the Nanaimo coal mines is steadily increasing, the monthly tonnage now being over 30,000 tons.

Nelson District.—At the annual meeting, at Nelson, of the B. C. Standard Mining Co., owning the Hunter V mine at Ymir, the directors reported that a 30-bucket tramway has been erected; also a smaller subsidiary two-bucket tram and a 200-ton ore-bin. The Hunter V mine has been developed by open cuts, shallow pits and drifts. Shipments are being made to the smelters at Nelson, Trail and Northport at the rate of about 40 tons a day.

Slocan District.—The managing director of the Arlington mine, near the Slocan City, states that the proposed 50-ton mill will be in operation before 1905. The ore will be crushed in a 20-stamp mill and carried by automatic distributors to six Overstrom tables; the slimes will go through a Klein separator. It is estimated that 90% of the silver values in the Arlington dump can be saved by this method at a cost of $3.50 per ton. The Sunset mine has paid a dividend, No. 10, of $6,000.

Yukon.—Mr. Beaudette, the Dominion engineer in the Yukon, says that the country near Dawson will long continue to yield annually a large amount of gold, the difficulty there being the scarcity of water. For ordinary placer mining only gravel going $2 per cu. yd. or over will pay, but by hydraulic methods ground averaging 25c. can be profitably worked.

San Luis Potosi. Feb. 23.

(From Our Special Correspondent.)

It is said that a smelter will be built in Chihuahua by Enrique C. Creel, the financier.

There is talk also of a smelter for Parral. The cost of the fuel would be its principal drawback. At the San Francisco del Oro a tram is being put in. The Montezuma Lead Co., of Santa Barbara, is running full, and shipping to the company's smelter at San Luis Potosi; the magnetic separator is handling zinc ore successfully. The Tecolotes, of the Guggenheim Exploration Co., across the gulch from Montezuma Lead Co., is temporarily closed, for some unknown reason. Milwaukee men have bought the Nesbit and Bacera properties, near the Lluvia de Oro, in the Urique district. A 40-stamp mill is planned for the Dios de Guia. From Cerro Almaloya, a five-mile road is being built to connect with the Mexican Central, between Jimenez and Parral. The Jimulco Mining Co. is building a road of about five miles to connect with the Central at Jimulco. The Refugio mine, of Angel Carisa, Parral, has been sold to an English company for $300,000, Mexican. A. J. Sullivan, of Santo Domingo, has bought the Tres Mercedes, Promontorio and Santa Eulalia, near Chihuahua, from Enrique C. Creel, for the reported price $100,000, gold.

In Jalisco, the Nogales Copper Co. and the Amparo Mining Co. are both putting in reduction plants, using Loomis-Pettibone gas generators and Crossly engines. The Amparo company will use the Pohle-Crossdale volatilization system, Mr. A. L. Waters, manager of the Keystone Copper Smelting Co., is busy starting the mill at Tapalpa. The Altamura Mining Co. is a Chicago company organized by Dennis Ryan, which has bought a group of mines about four miles south of Etzatlan; it is capitalized at $100,000 gold. The Calaboza, at Etzatlan, of the Dwight Furnace Co., is said to be under option of the American Smelting & Refining Co. The Monterey Iron & Steel Co. has contracted for all the iron ore of a certain grade from the Cerro del Mercado. The owners of the latter have some 300 men at work. The ore is broken down and loaded into cars at less than 30c., Mexican, per ton.

At the meeting of the Providencia San Juan de La Luz Co., held at Mexico, recently, the minority accused the directors of neglect, ignorance and misrepresentation in stating that ore bodies valued at over $10,000,000 had been blocked out, but under the Mexican laws the minority was powerless, the directors having been elected for six years with full power.

At El Oro the Dos Estrellas, in its new Cedro tunnel, about half a mile north of the main, or Fournier, tunnel, is encountering at 550 m., many stringers of ore.

At a recent meeting of the Chihuahua Mining Co., a proposition was made to exchange the stock, and consolidate with the Primavera, Omega, El Globo and La Chaquita, in an Arizona company, capitalized at $300,000, gold. A committee has been appointed to act for the stockholders.

London. Feb. 20.

(From Our Special Correspondent.)

In my last week's letter I gave some particulars of the proposition to split the Exploration Co. into two separate bodies, one to take over the assets of doubtful value not connected with mining, to be called the Exploration Assets Co. and the other to acquire the mining assets, to be called the New Exploration Co. At the meeting of shareholders called to sanction the scheme, there was an unexpected amount of opposition. A considerable section of the shareholders advocated the reduction of capital by writing off the whole of the doubtful assets as a loss. It was pointed out, however, that such a writing down of capital could not be carried out, because the capital had not been actually lost. At the present time it is impossible to say when the actual value of these assets will be determined, and what proportion will be recoverable in cash. These criticisms of the board's policy and counter-propositions were for the most part, made in good faith, but one of the speakers, Mr. Frederick Walker, transgressed the bounds of good taste by making all kinds of personal accusations against the board, and against Mr. R. T. Bayliss in particular. Readers of the reports of the meeting that appeared in the English press, not knowing the whole of the facts of the case, would get a very wrong impression of the present state of things, if they took any notice of Mr. Frederick Walker's speech. This gentleman is a lawyer, who delights in making violent attacks on boards of directors, chiefly with a view of getting himself elected to a committee of inquiry, or to the board itself; and so advertising himself in his professional capacity. It is necessary to point out that he made the mistake of not discriminating between the present and past boards. The board which embarked in the disastrous speculations in French industrials may have deserved his objurgations, but the present board and Mr. R. T. Bayliss, its active head, should surely receive the support of all shareholders. A man like Mr. Bayliss, who stepped in at a critical moment and saved the company from wreck, deserved sympathy rather than opposition and abuse. It is remarkable how some members of the public, who no doubt pride themselves on their acuteness, cannot distinguish between fraudulent company operations, of the Whitaker Wright type, and legitimate mining business.

Last week I referred to the report of Le Roi No. 2, Ltd., and mentioned, that although the directors spoke favorably of the results obtained by the Elmore oil concentration process, they gave no definite figures. At the meeting of shareholders, held this week, Mr. Stanley Elmore gave some account of the work of the plant. For some reason the proceedings at this meeting were not reported in any London paper, so that Mr. Elmore's speech has not been published to the world in general. He mentioned that the last results to hand covered a run of five weeks, during which time only unskilled labor had been employed. The ore treated was taken from the dump and the contents were approximately $3 in gold, 1 oz. silver and .75% copper; making practically $5 ore. The ore was first passed over Wilfleys, during which operation about 35 to 40% of the values were extracted, relatively more of the gold than the copper being obtained. Afterwards it was passed through the oil concentrator, and the tailings eventually contained .75 dwt. of gold per ton, less than .25 oz. silver and .1% of copper. The oil loss was 1.03 gal. per ton of ore treated.

Melbourne. Jan. 30.

(From Our Special Correspondent.)

The gold output of Victoria for January was 61,517 oz., gross. The principal contributors were the Bendigo mines, the South New Moon, New Moon and Great Northern being the leading producers. Mr. Geo. Lansell in December drew £8,000 in dividends from his Bendigo mining investments, and owns the majority holding in the Virginia, into which the Great Northern ore shoot is dipping. The Avoca Deep Leads is promoted by Mr. Frank Dunsford; 10,000 acres have been secured on the course of the lead. Local capital has not dared to tackle the task of pumping, but it is said that £250,000 is to be provided by English and American friends of Mr. Dunsford. About 30 miles of Avoca lead has been proved by deep surface boring. The Broken Hill Proprietary Co., which has its head office in Melbourne, though its mine is at the Barrier, N. S. W., has declared a dividend of £1, 6s. per share, aggregating £72,000. The directors have startled the Silverton Tramway Co., which owns the railway from Broken Hill to the South Australian border, by announcing that the mining company intends to build its own tramway, 30 miles long, to connect with the South Australian railway system. This would make the Silverton Tramway Co. lose 45% of its traffic. If the company cuts freights to suit the mining companies, it will lose much revenue. Our most promising field just at present moment is Rutherglen, where yields are swelling most satisfactorily, all because the Government granted two companies down the lead some £25,000 to pump the water. The companies have to pay back the money when they start to earn profits.

The North Duke mine, Maryborough, has closed an instructive career. Gold won, valued at £239,038; calls paid, £55,208; dividends only £33,750. Of the company's total revenue of £129,247, £123,000 was paid directly in wages and £56,416 for fuel, timber and supplies. The amount called per share was £1, 2s. 1d., while dividends only aggregated 13s. 6d., so that shareholders are 8s. 7d. per share to the bad on 50,000 shares over the venture. Yet the Miners' Association fights at every stage any concession in the laws that will tend to ease the way for capitalists and investors in mining. The members cannot be made to see that the present stagnation in outside districts arises directly from their obstinacy in insisting on the fulfilment of impossible labor conditions on mining leases.

Messrs. Bewick, Moreing & Co. are just completing the purchase of a commanding block of shares in the Great Berry alluvial mine farther along the Berry lead at Smeaton. They will take over at a nominal figure about 65,000 shares out of 120,000 in the company. No work has been done on the claim, but the policy of the firm is to push operations as soon as possible. It will probably cost quite £75,000 to get into the lead, and probably three years' work. On the stock exchange the majority of the members barely find sufficient business to meet current expenses, as the public are shy of mining speculation. Still, for the leading prospecting shows such as the mines at Rutheylen capital is forthcoming.

Sydney. Feb. 10.

(From Our Special Correspondent.)

At Broken Hill the sulphide corporation is about to extend the electromagnetic system (Mechernick's) of ore treatment. The corporation last year treated 55,700 tons, obtaining bullion with 60,359 oz. gold and 1,219,870 oz. silver. In spite of the water famine the Broken Hill returns for 1903 are fairly satisfactory, the exported value being £1,321,258, against £1,327,350 for 1902. The Broken Hill company is resuming work.

Braidwood dredging for 1903 accounts for 15,321 oz., valued at £58,798, an increase of 2,393 oz. over 1902. Araluen Central dredge No. 1 for last week obtained 62 oz. for 138 hours' work, and No. 2, 28 oz. for 107 hours. The King's Reef, Hill End, has treated 57 tons for 9,323 oz. Scheelite mining at Hillgrove is active.

New South Wales.—The prospects at the Shuttleton mine, Crowl creek, are very good; at the lowest level, 330 ft., the lode is 12 ft. wide, 4 ft. being yellow sulphide with 22% copper. The Caledonian Coal Co. has purchased the balance of the Aberdare Co.'s property, and will spend £100,000 in development. The gold returns for 1903 give 254,260 oz. fine (£1,080,029), as against 161,255 oz. (£684,970) in 1902.

Queensland.—The gold returns for 1903 are very satisfactory. As far as estimated the total is 659,042 oz. fine, valued at £2,799,579, an increase of £78,940 over 1902. Additional returns are to follow. The total gold yield since the inception of the industry is 16,533,055 crude oz., valued at £55,472,314, of which Charters Towers and the Cape River accounted for 6,123,161 oz.; Gympie, 2,764,195; Croydon, 1,057,537, and the Rockhampton District (1883-1903) for 2,750,966 oz. The December returns are high. In December Charters Towers produced 22,444 tons, yielding 35,325 oz.; Gympie, 19,059 tons, yielding 19,858 oz.; Mt. Morgan, 20,105 tons, yielding 10,072 oz. The Charters Towers mines during 1903 have paid £460,000 in dividends. The Gympie gold-field has had a record year; 186,639 tons were treated for 176,376 oz. crude. Manganese deposits at Degilko, which occur as bunches in a jasperoid rock in slate country, assay up to 68% manganese dioxide.

South Australia.—A fire has started in the Wallaroo copper mine. The shaft has been sealed, but without result so far.

Tasmania.—The mineral output of Tasmania for 1903 will show a decrease on the figures for 1902, due to smaller copper and gold returns. The output of tin, however, will be increased.

Victoria.—The 1903 gold output is highly satisfactory, amounting to 822,424 oz. valued at £3,259,482, as compared with 777,738 oz. crude extracted in 1902. The return from the Bendigo gold-field for December was 23,974 oz. and for the year 233,589 oz. Since its beginning, in 1851 to 1903, the field has yielded 17,729,439 oz., valued at £70,917,756.

TO ENGINEERS VISITING NEW YORK.

A room for the exclusive use of visiting mining engineers is maintained at the New York office of the ENGINEERING AND MINING JOURNAL. Visitors to the metropolis are cordially invited to take advantage of the facilities it offers, by having their mail addressed in care of the JOURNAL, and making this office their headquarters. The managers of the branch offices will also be glad to welcome visiting engineers and to be of any service to them that they can.

TO ENGINEERS VISITING LONDON.

We are informed that the Institution of Mining and Metallurgy offers to all members of the American Institute of Mining Engineers nonresident in Great Britain, the privilege of free use of the Institution offices and library in Salisbury House, London Wall, E. C. Visiting engineers may have their letters addressed to the offices of the Institution, and thus enjoy the advantages of temporary office accommodation in the city of London.

PERSONAL.

Mining and metallurgical engineers are invited to keep the Engineering and Mining Journal informed of their movements and appointments.

Mr. John B. Farish is in New York.

Mr. E. M. Rogers has returned to New York from Nevada.

Mr. Edwin N. Hawkins, of Denver, is visiting Philadelphia.

Mr. F. C. Roberts sailed from London for New York on February 27.

Mr. J. Morgan Clements left New York on February 26 to proceed to Peru.

Mr. Ralph Nichols sailed from New York by the *Philadelphia* on February 27.

Mr. H. L. McCarn is superintendent of the Planet mine, at Planet, Arizona.

Mr. J. V. Burn Murdoch has left British Columbia on a journey to Mexico.

Mr. Percy Williams is manager of the Imperial mine at Red Rock, Arizona.

Mr. H. W. Hardings has reached New York on his return from Parral, Mexico.

Mr. H. F. Strange has been elected president of the Transvaal Chamber of Mines.

Mr. C. Ernest Stein, formerly in Chihuahua, is now at Guanacevi, Durango, Mexico.

Mr. C. T. Mixer, of Park City, Utah, is examining mining properties in Arizona.

Mr. H. Knutsen, of Kalgoorlie, Western Australia, is in Colorado, visiting cyanide plants.

Mr. J. R. Finlay, of Florence, Colo., has gone to Mexico to take charge of mining property.

Mr. William E. Sutton has opened an office as consulting engineer at Everett, Washington.

Mr. G. B. Wilson is engineer to the Chinese Engineering & Mining Co., at Tongshan, China.

Mr. Algernon Del Mar, of Pine Grove, Nev., has been in San Francisco on mining business.

Mr. J. D. Audley Smith is metallurgist to the White Knob Copper Co., at Mackay, Idaho.

Mr. C. G. Warnford Lock is manager of the Raub Australian mine, in the Malay Peninsula.

Mr. E. M. Sheppard, professor of geology at Drury College, Springfield, Mo., is in Oaxaca, Mexico.

Mr. R. A. F. Penrose, of Philadelphia, has gone to Colorado and Arizona on professional business.

Mr. G. G. S. Lindsey is managing director of the Crow's Nest Pass Coal Co., Fernie, British Columbia.

Mr. Geo. D. Barron, of Rye, N. Y., president of the Teziutlan Copper Co., is at Teziutlan, Pueblo, Mexico.

Mr. Franklin White is consulting engineer to the Wanderer mine, in Rhodesia, and Mr. J. B. Little is manager.

Mr. Henry F. Lefevre has recently returned to New York from the Cebollitas district in Chihuahua, Mexico.

Mr. David H. Lawrence, of Denver, is consulting engineer to the Masontown Mining & Milling Co., at Frisco, Colo.

Mr. R. M. Catlin succeeds Mr. Webb as resident consulting engineer to the Consolidated Goldfields Co. at Johannesburg.

Mr. J. Howell, late general manager of the Broken Hill Proprietary mine, Australia, was in San Francisco, Cal., recently.

Mr. John Seward has resigned the management of the Mohave Gold Mining Co., of Arizona, and is now residing in New York.

Mr. F. C. Cowan, of Colorado Springs, Colo., has been appointed chief metallurgist of the Utah Copper Co., at Bingham, Utah.

Mr. G. Charters, manager of the San Ricardo mine at San Ricardo, near Magdalena, Sonora, Mex., has returned from a visit to Canton, Ohio.

Mr. Karl Burckhardt, formerly geologist to the Museum of La Plata, has been appointed chief geologist of the Geological Survey of Mexico.

Mr. R. C. Bonney has been appointed manager of the Sun & Moon Mining Co., Idaho Springs, Colo., to succeed Mr. H. N. Sims, who retires May 1.

Mr. William A. Dunn has been appointed superintendent of the Phoenix Consolidated mine, Keweenaw county, Mich., succeeding Mr. Dunbar D. Scott, resigned.

Mr. C. S. Herzig, representative in New South Wales and Queensland of Bewick, Moreing & Co., has returned to Sydney, after three months' absence in Queensland.

Mr. H. H. Webb has been appointed consulting engineer, with residence in London, to the Consolidated Goldfields of South Africa, in succession to Mr. John Hays Hammond.

Mr. C. M. Allen is the new superintendent and chief metallurgist of the Pittsburg & Montana smelter, at Butte. Mr. Allen formerly had charge of the Butte & Boston smelter.

Mr. J. N. Esselstyn, recently manager of the Mountain View group, near Sumpter, Ore., has been appointed consulting engineer to the Geiser-Hendryx Co. in the Sumpter district.

Mr. Andrew S. McCreath, of Harrisburg, Pa., states that he has removed from No. 223 Market street to a newly equipped office and chemical laboratory at No. 121 Market street, and that hereafter his son, Lesley McCreath, will be associated with him under the firm name of Andrew S. McCreath & Son, as analytical and consulting chemists.

The course of Economic Geology at the University of Chicago now consists of a double study of 12 weeks, and during the present year it has been divided into two courses: "The Nonmetallic Mineral Resources" and "The Metallic Mineral Resources." The former course was given by Dr. E. R. Buckley, director of the Missouri Bureau of Geology and Mines, during January and February, and the latter course is now being given by Mr. H. Foster Bain, of the United States Geological Survey.

OBITUARY.

B. T. A. Bell, editor of the *Canadian Mining Review*, and secretary of the Canadian Institute of Mining Engineers, who fell down an elevator shaft in the Orme building, Ottawa, February 18, died of his injuries March 1.

Theodore J. F. Lexow, well known in the diamond trade, and president of the Yawger-Lexow Co., importers of diamonds, carbon and bort, New York City, died suddenly January 23 of heart disease, at his home in Brooklyn. He was born in Tonnington, Germany, 63 years ago, and came to this country when 20 years old. He was in the employ of Henry Fera, a New York diamond importer and cutter, for 15 years, and the following four years was manager for the diamond firm of Lewisohn & Co. In 1894 he went into business on his own account, importing carbon and bort, and January 1, 1902, consolidated with I. C. Yawger, for many years representative of Victor Bishop & Co., forming the Yawger-Lexow Co., of which he became president.

SOCIETIES AND TECHNICAL SCHOOLS.

SOCIETY OF CHEMICAL INDUSTRY.—The annual meeting will be held in New York City, September 8, 9 and 10. An informal reception, greeting the guests, many of whom will come from abroad, will be given at the Chemists' Club, on September 7. The opening session, called at Havemeyer Hall, Columbia University, on September 8, will hear the president, Sir William Ramsay. At the same time Mr. William H. Nichols, president of the General Chemical Co., and of the Nicholas Chemical Co., will be nominated as Prof. Ramsay's successor as president of the society. Mr. Nichols is the second American chosen for this honorary position, the first having been Prof. C. F. Chandler, of Columbia University. The itinerary of the meeting includes excursions to various manufacturing plants and points of interest, and at the close of the regular sessions the guests will be taken on a two weeks' tour through the country. An opportunity will also be given to members to attend the International Congress in St. Louis, beginning September 19. This year's meeting will be a memorable one, since it is the first to be held outside of Great Britain.

INDUSTRIAL.

A 100-ton slime plant is being built by the Allis-Chalmers Co. for the Buxton and Big Bonanza property in the Tuscarora district, Nevada.

Messrs. Fuerst Bros. & Co., of New York, doing a large business in Dutch East Indian products, wish to establish an import trade in Straits tin.

Paul Hey, Johannisgasse 10, Leipzig, Germany, would like to hear from American manufacturers who may care to export their products to Germany.

The A. Leschen & Sons Rope Co., of St. Louis, Mo., has finished its installation of a 6-mile aerial tram for the Cigarrero Mining Co., from its mines to Jimulco, Chihuahua, Mexico.

The United States Smelting Co., of Salt Lake City, Utah, has awarded the contract for structural material for the lead smelter buildings to the American Bridge Co., approximately 600,000 lb., of structural steel and iron.

The Link-Belt Engineering Co., Philadelphia, Pa., recently received an order from the Western Maryland & Tidewater Railroad Co., Baltimore, Md., for 40 adjustable chutes for bituminous coal, for use at the coaling wharf there.

The Guggenheim Exploration Co., New York, is about to install electrical machinery at its mines near Santa Barbara, Mexico. An electric power plant will be constructed to operate the company's narrow-gauge railroad and mill equipment.

The White Bear Co., of Rossland, B. C., has ordered a four-unit Elmore oil concentrating plant, capable of treating 100 tons per day, and Col. R. M. Thompson, of the Oxford Copper Co., has ordered a two-unit plant for his mine at Massey, Ontario.

The General Electric Co., New York, has secured a contract for a number of motors, varying in capacity up to 200 h. p., for direct connection to high-lift centrifugal pumps, built by the International Steam Pump Co., for installation in Mexican mines.

The Burt Manufacturing Co., of Akron, O., has sold the Jones & Laughlin Steel Co. a 30-in. exhaust head for the plant at Pittsburg, Pa. The American Ship Building Co. has given the Burt Manufacturing Co. a second order for Cross oil filters, for the yards at Lorain, O.

Juan Otero Galarreta, president of La Paz Mining & Smelting Co., of San Luis de la Paz, State of Guanajuato, Mexico, has been granted a concession by the Mexican Government for the use of the waters of the Blanco river, in the States of Queretaro and Guanajuato, to operate a reduction plant about to be built by the company.

A 30-day rush order from the Japanese Government on the Baldwin Locomotive Works, Philadelphia, for 20 locomotives for the Fusan & Seoul Railway, in Korea, was filled within

the time limit. The Baldwin Works has increased the capacity of the great plant so that seven locomotives are completed, ready to haul a train of cars, every full day.

The Fremont Power & Canal Co., Fremont, Neb., will build a 35,000-h.-p. plant on the Platte river, and will furnish electric power for Omaha, Lincoln, Council Bluffs, Fremont and Columbus. It is not expected that the company will be ready to deliver power for two years. The John F. Kelly Engineering Co., New York, has charge of the work.

W. H. Coverdale & Co. have recently been incorporated to do a general engineering and contracting business, with offices at 66 Broadway, New York. They will undertake matters relating to the design and construction of steam and electric railroads, lighting and power plants, coal and ore-handling machinery, etc. Mr. Coverdale was for many years in the engineering department of the Pennsylvania lines west of Pittsburg, and for the last three years has been civil engineer for a New York firm of engineers and contractors.

The boiler plant of the B. F. Sturtevant Co.'s new works, at Hyde Park, Mass., is in full operation. The plant comprises three 250-h. p. Stirling boilers, equipped with Jones under-feed stokers, air being furnished by a 6 by 28 in. Sturtevant steam fan operating at 2½ oz. pressure, a 9 by 4½ ft. Sturtevant induced-draft steam fan, and an economizer, the latter to be installed later. The maximum steam pressure carried will be 150 lb. The company has in process of construction a 400-h. p. vertical compound engine with direct-connected 250-k. w. generating set, which will be the first of several units to be installed in the engine-room.

Julian Kennedy, Sahlin & Co., Ltd., have taken a number of contracts for remodeling on American lines, the blast-furnace departments of the following plants: The Moss Bay Hematite Iron & Steel Co., Ltd.; Distington Hematite Iron Co.; Millom & Askam Hematite Iron Co., Ltd.; Carnforth Hematite Iron Co., Ltd.; Bolckow, Vaughan & Co., Ltd.; Cargo Fleet Iron Co., Ltd.; Parkgate Iron & Steel Co., Ltd.; New Cransley Iron Co., Ltd.; Holwell Iron Co., Ltd.; W. Roberts, Ltd.; Tipton Green Blast Furnaces; Guest, Keen & Nettlefolds, Ltd.; North Lonsdale Iron & Steel Co.; Baldwin's, Ltd.; Farnley Iron Co., and the Keltering Iron Co.

The Davenport Locomotive Works, of Davenport, Iowa, recently received an order for four standard-gauge engines to go to the Cerro de Pasco copper mines in Peru. The engines will be shipped by way of New York and Panama. They are especially interesting, because they are to work at a point 600 miles inland, and at an elevation of 14,000 ft. above the sea level. They will, therefore, require large fire-boxes and an extra draft to furnish sufficient oxygen for the combustion at such a high elevation of the poor coal used. This order was secured in the face of competition from American, German and English works. The company has also received an order for a 21-ton narrow-gauge freight engine for use in the State of Vera Cruz, Mexico.

The American Concentrator Co., of Joplin, Mo., report the following recent shipments: New Century differential motion jigs, Palacios & Trevino, Arrecla, Monterey, Mex.; complete concentrating plants, Washington Zinc Co., Arlington, Wash., and the Bear Top Mining Co., Murray, Ida; New Century Blake crusher, 12 by 20 in., to the Rossland Power Co., Rossland, B. C.; New Century belt-driven rolls, Maryland High Grade Flint Co., Finksburg, Md.; two compartment anthracite coal-washing jig; Scranton Coal Co., Scranton, Pa.; Knowles' New Century magnetic separator, Payne Consolidated Mining Co., Sandon, B. C.; New Century disintegrating screen, Catherine Lead Co., Fredericktown, Mo.: New Century differential motion jigs and ore feeder, to the Denver Ore Testing & Sampling Co., Denver, Colo.: a complete working model of a concentrating plant to the Missouri World's Fair Co., for exhibition in the Missouri State exhibit in the Mines and Metallurgy building, at St. Louis. This company is also preparing a complete line of its full-sized machines for exhibit at the World's Fair at St. Louis, among which will be the Knowles' New Century magnetic separator.

TRADE CATALOGUES.

A six-page folder, issued by Fairbanks, Morse & Co., shows a few of the types of gas, gasoline and crude-oil engines in combination with air compressors, hoists and pumps, which this company is manufacturing.

The Buff transit and its adjustments are made the subject of a 34-page catalogue, issued by the Buff & Buff Manufacturing Co., of Boston, Mass. Much valuable information is given on the use, care and construction of the instrument.

The Baldwin Locomotive Works, of Philadelphia, Pa., has issued a very creditable booklet, No. 45, which is referred to as a "Record of Recent Construction." The contents pertain to a great variety of locomotives for different gauges, and for different kinds of service, and also presents other matters of interest in connection with locomotive work. The illustrations deserve special commendation.

The Crocker-Wheeler Co., of Ampere, N. J., has issued a pocket-size catalogue of 16 pages, heralding its variable speed-motors for driving individual machine tools. This catalogue is referred to as "Flyer" No. 145. A new innovation of this company is the issuance of a number of 4-page folders, each of which is devoted to the application of an individual motor to some one particular machine.

The Geo. F. Blake Manufacturing Co., of New York City, in bulletin B 62, describes power-house auxiliary machinery for vacuum making and boiler feed, including rotative dry vacuum pumps, vertical cross-compound, simplex, etc. The apparatus is designed to meet the requirements of steam turbine and reciprocating engine units of 5,000 to 10,000 h. p., using steam of 200 to 300-lb. pressure.

GENERAL MINING NEWS.

ALABAMA.

JEFFERSON COUNTY.

Pittsburg & Southern Coal & Iron Co.—This company, of Pittsburg, has been incorporated with $300,000 capital, and acquired 545 acres of ore property on the Louisville & Nashville Railroad, 12 miles from Birmingham. In addition 4,000 acres of coal property have been acquired. It is reported the capital will be increased to $1,200,000, and a blast furnace erected. M. M. Bosworth, formerly secretary of the H. C. Frick Coke Co., is president, and Walter Kennedy general manager and engineer.

ARIZONA.

COCHISE COUNTY.

Copper Queen.—It is said arrangements are being made for sinking an 8-compartment shaft near Bisbee. This shaft will be sunk in a central location, just below the Lowell and Gardiner shafts, on the Stars and Stripes claim. The company is building 50 houses in Douglas, which will be turned over to the smelter men at cost.

(*From Our Special Correspondent.*)

Calumet & Arizona Mining Co.—This company has declared its second dividend, payable March 19. This makes $300,000. Dividend No. 1 was $1.50 regular and 50c. extra. The company is now preparing to double its smelter capacity, in order to take care of the output from the new Oliver shaft, and will probably be able, by a loan, to assist in the development of the South Bisbee lands for the Lake Superior & Pittsburg Co., which must pay $1,050,000 for its properties in June next. The company also intends to maintain a large surplus. The company's Oliver shaft will soon require smelting capacity for 600 tons daily. The two smelters are now making about 100,000 lb. of copper daily.

Junction Development Co.—At a depth of 450 ft. the large shaft got ore a few days ago. This is not supposed to be a large body.

Lake Superior & Pittsburg Development Co.—This company is to be reorganized into a mining company in May, and will call sufficient funds for the payment of $1,050,000 due on the ground and for development and smelter construction. It is likely that the basis of reorganization will be such as to give at least $1,500,000 in cash, all allotted first to present development stockholders. Doubtless every share will be taken by those entitled to it. The issued capital stock of the new company will probably be about $3,000,000, with possibly $500,000 left in the treasury.

MOHAVE COUNTY.

(*From Our Special Correspondent.*)

Ben Harrison.—This mine, in Snowball district, has broken into a rich body of gold ore on the 100-ft. level.

Buckeye.—This mine, at Mineral Park, has been taken over by M. Wilson & Co., of Wickenburg, Ariz., on a bond and lease.

Elkhart.—This mine, at Chloride, has changed ownership. The new company will sink the 500-ft. shaft 200 ft. deeper.

Enterprise.—This mine, on Wallupui mountain, 15 miles east of Kingman, is sacking lead and silver ore. W. A. Mensch is superintendent.

Gem.—This mine, at Cerbat, is to be taken over by a new company, capitalized at $100,000, which will build reduction works and thoroughly develop the property.

Gold Leaf.—This mine, in Gold Basin, is installing cyanide tanks of 200 tons capacity.

Gold Road.—This mine, at Acme, is reported shipping from $12,000 to $15,000 in gold bars monthly.

Leland.—This mine, at Milltown, is cyaniding 30 ft. of ledge matter.

Paymaster.—This mine, at Todd Basin, worked by the Chloride Gold Mining Co., of Pueblo, Colo., has 25 men busy.

Pilgrim.—This gold mine, nine miles west of Chloride, has a shaft over 100 ft. deep, through a body of shipping ore. Two other shafts are under way. Dempsey & O'Dea are the owners.

Roger Boy.—This mine, on Cerbat mountain, is to install a gasoline hoist. The shaft is 93 ft. deep in high-grade shipping ore.

CALIFORNIA.

AMADOR COUNTY.

Amador Queen Mining Co.—This company has been organized to work the Amador Queen mine with the following directors: W. N. Bardue, J. M. Howells, Whittaker Ray, S. C. Denson, J. G. Maguire, R. S. Green and Lewis H. Watts.

Bunker Hill.—A preliminary run is being made at this mine, Amador City, C. R. Downs, manager, with the new 20-stamp mill, run by electric power.

Defender.—At this mine, Defender district, F. B. Joyce owner and manager, men are drifting south on the 200-level for an ore shoot.

BUTTE COUNTY.

Long Mineral Extracting Co.—William L. Long, president, and J. C. Werner, secretary, are about to remove their machinery from Twin Lakes to Oroville, where they have secured good sand.

CALAVERAS COUNTY.

Claxton.—William O. Huson and Rose Stolker have sued Charles P. and Frances E. Williams for selling them a portion of an interest in a worthless mine. The plantiffs allege the property was represented to be virgin ground, but proved valueless.

Del Monte.—Work has been resumed at this mine, Railroad Flat, with two shifts on the long cross-cut tunnel, and an Ingersoll drill has been installed. The O'Neills have sold their interests to George I. Wright, who now has charge.

Gwin Mine Development Co.—At Gwin mine, F. F. Thomas, Manager and David McClure, superintendent, 250 men are at work running 100 stamps on ore from the 1,600 and 1,700 ft. levels. The main and south shafts are 2,000 and 1,600 ft. deep, respectively. Besides the water power plant this company also has a reserve steam plant. After the water is used at mill and hoists it is carried down the canyon and there used for compressing air for the drills and pumps. At the south shaft repairs are being made and a double reel hoist being set up.

Kiser & Maguire.—At this mine, near Mokelumne hill, some heavy nuggets are being found.

ELDORADO COUNTY.

Deutcher Bund.—A new double discharge one-stamp mill has been put in at this mine, Poverty Point district.

Diamond Hill.—Gravel has been struck in this mine, operated by George Nugesser. A shaft house, shops, etc., have been put up.

Rescue.—At this mine, Al Anable, superintendent, a shaft has been started and ground is being graded for a steam hoist.

INYO COUNTY.

World Beater.—George Montgomery is about to resume work on this group, at Ballarat. A chute of rich ore has been opened, and a company will carry on operations.

KERN COUNTY.

Peerless & Fulton.—These oil companies, operating at Kern river and Sunset district, are producing largely. The Peerless yielded 190,000 bbl. in January, and delivered, according to contract with the Standard Oil Co., 150,000 bbl. At the Fulton six wells are finished, and the first reservoir, having a capacity of 107,000 bbl., is being filled.

MARIPOSA COUNTY.

Cavan Mining & Milling Co.—This company, A. W. King, president, is doing considerable work on its copper mines and has a fine body of ore in the San Jose shaft.

Lone Tree.—A Fresno company is sinking a 500-ft. shaft on this mine.

Toad.—This company is sinking a 500-ft. shaft, now down 200 ft. New gasoline hoisting works have been set up.

Waller.—Wilcox Bros., who have a lease on this copper mine, are taking out considerable good ore.

MONO COUNTY.

Crystal Lake Mining Co.—This company, at Lundy, R. T. Pierce, manager, has completed its 3,000-ft. tunnel, which taps the ledge 1,400 ft. below surface workings. About 25 men are at work, though 100 are employed during summer. The pay of miners in this county is $4 per day, the highest in the State.

NEVADA COUNTY.

Mountaineer.—Much work is to be done at this mine, Nevada City, including sinking of a new shaft. Some rich ore is being taken out by J. C. Campbell, superintendent.

Seven-Thirty.—G. W. Root, of Grass Valley, has a bond on this mine at Rough and Ready, and a new shaft is to be sunk and machinery put up.

Sierra Queen.—This company, at Nevada City, has elected S. W. Marsh, president; E. T. Powell, vice-president, and D. L. Miller, secretary and superintendent. The affairs of the mine are in good condition.

PLUMAS COUNTY.

Johnny Bull.—An examination of this group of claims in North Cañon has been made with a view of determining the class of machinery most desirable for saving the gold.

Tepescal.—F. R. Porter and G. K. Leonard, of Los Angeles, have nearly completed the plant intended to treat the tailings.

SAN BERNARDINO COUNTY.

Echo Bend.—This district is 50 miles below Needles, in the range of foothills skirting the Colorado river. The Colorado River Gold & Copper Co. has spent much money in development and has a lot of valuable ore in the Black Metal lode. The Mount Whippel Co. is arranging to handle its ore. Manning Bros. have a good deal of ore in sight. Ross & Ganlon have a showing in the Palo Verde. Platinum is found further west in the Copper Basin, where Robert Intram has claims.

SAN DIEGO COUNTY.

California King Mines Co.—This company, at Picacho, has voted to issue $200,000 bonds secured by mortgage on the property, to pay the Colorado Iron Works the balance of $40,000 due on the mill plant and to put the mines in a producing stage.

Cleveland & Pittsburg Mining Co.—W. Z. McDonald is now at Escondido preparing to put in new hoisting machinery. Work is to be resumed on the vertical shaft, which is to be sunk to 500 ft.

Helvetia and High Peak.—Work is resumed on these mines, at Julian, owned by the Julian Consolidated Mining Co., A. B. Hall, superintendent. The steam hoist at the new shaft of the Helvetia has been moved to the High Peak, to replace the gasoline plant, destroyed by fire.

SANTA CLARA COUNTY.

San Juan Quicksilver Mining Co.—John Joyce, president of this company, has left San Jose for Boston, to arrange for the consolidation of the San Juan and Santa Teresa quicksilver mines, near San Jose. They are owned by practically the same men, mostly residents of Boston. At the San Juan a 24-pipe retort is at work and 24 more pipes are being put in, giving a capacity of 16 tons daily. In the spring a 20-ton Scott furnace is to be erected. The old tunnel has been cleaned out and retimbered, and cinnabar ore is now being stoped out. R. B. Harper, of San Jose, is manager of both the mines.

SISKIYOU COUNTY.

Mount Vernon.—M. Jacobs, C. Beisel and L. Marinell, of Spokane, Wash., who have bought this mine near Yreka from George V. Gray, intend putting up a 10-stamp mill with concentrators.

TRINITY COUNTY.

Fairview.—This company, at Minersville, has placed a contract for 20 additional stamps to their mill, making 30 stamps in all.

Yellow Rose of Texas.—The main ledge has been struck in the lower tunnel of this mine at Dorleska, but the principal pay shoot has not yet been reached.

TUOLUMNE COUNTY.

John Daly has sold to J. F. and F. H. Baker the Sunnyside, Hill Top and Never Sweat mines and mill.

Republic.—The 4-stamp mill of the Densmore mine has been removed to this property near Robinson's Ferry, operated by S. Wilhelm.

Yankee Hill.—This mine, at Columbia, is to increase its milling capacity from two to seven stamps.

COLORADO.

BOULDER COUNTY.

The men who have the bond and lease on the big chlorination mill at Eldora recently inspected the property, and the mill is now out of the hands of the receiver. Work will soon start on remodeling the plant.

Big Five Mining Co.—The State Supreme Court has taken jurisdiction in this suit and ordered T. J. Sipple, who had been appointed receiver, to relinquish his attempt to secure possession of the company's books and property until further orders.

Chicago Bird's Nest Mining Co.—This company has resumed work on the property, on Spencer mountain, near Eldora.

Consolidated Copper Gold Mining & Milling Co.—This company is driving the big tunnel at the base of Arapahoe peak, near Eldora, to cut the ore bodies of the Fourth of July mine, and is now in nearly 1,600 ft., running full force with its big drills.

Northwest Gold Mining Co.—This company, owning seven claims near Eldora, is down 300 ft. in the main shaft, and is driving and crosscutting on the lower level. A vein is reported cut which assays 15% copper, 160 oz. silver and 1.25 oz. gold. This is one of the old Caribou properties, and a full force of men is worked.

CLEAR CREEK COUNTY.

Golden Cloud Mines Co.—This company has four patented claims in Russell gulch, and is sinking a shaft, now down about 500 ft. In the fourth level ore has been exposed 8 ft. wide. The output of this drift, 12 tons per day, is taken out by two men. H. G. Pearce, of Denver, is manager, and L. E. Tobias, of Idaho Springs, superintendent.

GUNNISON COUNTY.

Green Horn.—A rich strike is reported on this group, near Bowerman, owned by Hurley & McChane, of Leadville. They have opened a vein at grass roots said to be 25 to 30 ft. in width and to assay through a considerable portion of its width as high as $5,000 to the ton.

LAKE COUNTY—LEADVILLE.

(*From Our Special Correspondent.*)

Diamond.—This mine is shipping about 125 tons per day, and much development is being carried on by the company. It is probable that the company will start the Vega in the spring.

Penrose.—The old steam and water pipes have been taken out of the shaft and retimbering is in progress.

Golden Curry.—This mine, in the Sugar Loaf district, adjoining the Tiger, has opened three feet of sulphurets at the breast of the tunnel, 500 ft. in. The ore goes from 41.5 to 91.5 oz. silver.

Huckleberry.—This mine, in the St. Kevin district, shipped ore recently that netted $80 per ton.

Moyer.—This property continues to output 350 tons daily of oxidized and sulphide ores, and is in first-class physical condition.

Penn.—This mine is shipping 50 tons daily of a very good silicious ore. Development work is pushed in new territory.

Radium.—This mine, in French gulch, is working three shifts. The values of the recent gold strike are holding out well, but it will take several days to determine the extent of the shoot.

Reindeer.—Ore is being shipped from this new strike, on Rock hill, steadily.

Shinn.—The money for this tunnel, to cut the divide between Lake and Park counties, has been subscribed, and work will begin on the Leadville side in April.

Yak Tunnel.—A great deal of new work is being carried on besides the different leases, the company is shipping over 3,000 tons of ore per month.

OURAY COUNTY.

Atlas Mine & Milling Co.—This company has been incorporated to work the Atlas mine, on which a rich vein was recently opened. The Atlas was owned by C. N. Carroll, the superintendent of the new company which owns seven claims in the Sneffels district, adjoining the Revenue, near Ouray. The main tunnel is now in 1,200 ft., giving a depth at the breast of 500 ft. A 10-stamp mill will be erected.

SAN JUAN COUNTY.

Astor Mining Co.—E. C. Condit, manager of this company, operating in Eureka and Picayune gulches, near Silverton, states that money sufficient to carry on development, purchase machinery, etc., has been subscribed by the stockholders. Machinery now installed consists of a water-wheel, dynamo, a 25-h. p. hoist, one 10-h. p. pump, fan and two power-drills. A new 40-stamp mill, the machinery for which will be purchased shortly, is expected to be completed by the latter part of August.

Gold Spur Mining & Milling Co.—This company has made application for patents to several claims and the Gold Spur mill site, on the east end of Solomon mountain, near Silverton. This company has been developing the past 12 months, and a long crosscut tunnel has been run into the mountain. The ore bodies are concentrating, and it is the intention of the management to erect a large concentrating mill.

Treasury Tunnel & Mining Co.—This company is working the Hammond tunnel, on the west fork of Red creek, above Chattanooga. This tunnel was started to cut the continuation of the famous Tom Boy fracture, but on attaining a depth of 4,500 ft., the junction of the Corncob and Cloudy Day veins was reached, opening up 8 ft. of milling ore containing copper, iron and zinc. On the foot wall is a small streak of ore carrying free gold. The company paid George Boss, Barney Dupraw and others $15,000 for the Corncob, Cloudy Day and Liverpool claims. For the last six months drifting on the Corncob vein has been in progress and the headings of both drifts are reported still in ore. Development continues with 35 miners. The property is equipped with a 9-drill compressor plant and a 100-h. p. boiler. Superintendent

Russell is to start the foundation for the new 250-ton mill, to be erected below the mouth of the big tunnel, and connecting with a branch of the Silverton & Red Mountain Railroad.

SAN MIGUEL COUNTY.

(From Our Special Correspondent.)

Butterfly-Terrible.—About 40 miners are taking out an average of 7 tons of ore daily. The pay streak worked averages from 1 to 3 ft. wide and is mined so as to enable a large force to work at one time. The ore averages $9 per ton in gold, the values being saved by amalgamation. The east drift is in 600 ft., and about 200 ft. remain before the eastern limit of the Butterfly ground will have been reached. This drift is about 320 ft. below the level above.

Carribean-Montezuma.—Work at present consists in exploration, about 30 men being employed.

Ophir Consolidated.—Although the work going on at the Silver Bell now is largely development and exploration, enough ore is being taken out to supply 20 of the 50 stamps in the mill. It is expected that within a month the property will begin production at full capacity.

TELLER COUNTY—CRIPPLE CREEK.

(From Our Special Correspondent.)

Cripple Creek Homestake Gold Mining Co.—This company, on Ironclad hill, is now treating between 150 and 200 tons per day at its cyanide mill recently erected. The company owns the old Ironclad property, and also the Magna Charter. The low grade oxidized ore can be treated without roasting. The mill is said to be a first class plant in every respect, and the management will increase the capacity as soon as practicable. B. Ross, of Cripple Creek, is in charge.

Elkton Consolidated Gold Mining Co.—It is understood that this company will remodel its ore house. A number of lessees are at work, some of whom are getting good ore. The drainage tunnel is steadily approaching the property, and before long the eighth level can be recovered.

Free Coinage Gold Mining Co.—The new lessees, J. O. A. Carper and associates, of Denver, are to sink a new shaft, but so far have not decided on its position. It is understood that the lease is for five years. The property consists of five claims on Bull hill, and has produced a large amount of ore. It is owned principally by the estate of the late Sam Strong.

Stratton's Independence; Ltd.—It is understood that the advisability of leasing the entire property is seriously considered. A recent shipment of about 11 tons of ore returned a little over $1,000 to the ton. The property is running about as usual. Max Boehmer, of Denver, is in charge.

Strong Gold Mining Co.—This company is installing two marine boilers on the Strong property, and is shipping steadily. Sam McDonald, of Cripple Creek, is in charge.

Zenobia.—This property, controlled by the Stratton estate, has been leased to James Wright, now leasing on the Thompson, of the Elkton company. The terms of the lease have not been learned, but it is understod that considerable sinking will be required. None of the other properties of the Stratton estate will be leased at present.

MICHIGAN.

COPPER—HOUGHTON COUNTY.

(From Our Special Correspondent.)

Baltic.—This company has stopped all work at the mine and mill owing to a strike. Miners demand a flat rate of $2.50 per day, and trammers and timbermen $2.25 per day. About 900 men are idle.

Calumet & Hecla.—Hoisting has been resumed with the Kimberly skips in the damaged compartment of the Red Jacket shaft. No. 20 shaft has cut the Kearsarge amygdaloid, and the lode may be opened by drifts.

Centennial.—One drill is in commission at the bottom of No. 1 shaft, which is sinking to the 28th level. Drifting is under way at several levels.

Champion.—Work has been suspended since February 15, when the men went out owing to a cut in wages.

Elm River.—Sinking has stopped at a depth of 525 ft., and a crosscut is being run to a lode tapped with a diamond drill last summer.

Michigan Smelting Co.—Work on the new plant at the mouth of Cole's creek, west of Houghton, on Portage lake, has been retarded by the cold weather. The plant is for the joint use of the Wolverine, Mohawk, Atlantic, Baltic, Trimountain and Champion companies and will also do custom smelting.

Trimountain.—Operations at the mine and stamp mill have been suspended for two weeks, owing to a strike. Superintendent F. W. Denton has returned from Florida, but so far all efforts toward a settlement have failed.

Wolverine.—The stamp mill is treating 1,075 tons of rock daily and 30 power drills are in commission.

COPPER—KEWEENAW COUNTY.

(From Our Special Correspondent.)

Allouez.—The new shaft to open the Kearsarge amygdaloid is down 475 ft., and sinking 90 ft. per month. It is expected that the lode will be cut next September.

Cliff.—Diamond drill work on this old property, owned by the Tamarack Mining Co., is under way again. That part of the tract probably traversed by the Kearsarge amygdaloid will be cross-sectioned.

Phoenix Consolidated—The West vein shaft is down 850 ft. In the eighth level drift south an amygdaloid belt has been opened and some large masses of copper taken out. The St. Clair shaft, which is sunk on the dip of the lode, is down 1,750 ft.

COPPER—ONTONAGON COUNTY.

(From Our Special Correspondent.)

Adventure Consolidated.—The stamp mill at Edgemere was idle one week owing to an accident to one of the engines. It is now handling 350 tons of rock per day.

Belt.—It is reported that this old property will be opened in the spring. New York men have an option on it.

Victoria.—Sinking in No. 2 shaft has passed the 21st level and is under way nearly 2,000 ft. from surface. The drifts at the various levels below the fourth are in fairly good copper-bearing ground. The mine has nearly five miles of openings and within a few weeks work on a new shaft 1,190 ft. west of No. 2, which will be the main working shaft.

IRON—GOGEBIC RANGE.

Hayes.—Exploratory work has been started on this property near Mellen, which joins the property of the Holmes Mining Co. A diamond drill will be installed.

Sunday Lake.—This mine was closed down in the fall on account of a strike against reduced wages. It has resumed operations at the company's scale.

IRON—MENOMINEE RANGE.

Corrigan-McKinney.—At the Crystal Falls mine the new crushing plant is now about completed. At the Tobin a crusher is being installed. Tobin ore has been broken heretofore.

Mansfield.—At this mine, near Crystal Falls, men are developing ore in the lower levels, and the mine is looking well. The shaft is being sunk to the 13th level.

MINNESOTA.

IRON—MESABI RANGE.

(From Our Special Correspondent.)

Orelands Mining Co.—This company, of Duluth, which has been exploring in Aitkin county, near the village of Kimberley, has taken State mining leases on lands in section 36, T. 46, R. 29, north and east from Brainerd and about two miles south of the line of the Northern Pacific road. Considerable exploration is to be done in that vicinity, both by the Orelands company, the Oliver Iron Mining Co. and St. Paul interests. The leases can be had at a low price and the district is a possibility. The Orelands company has been busy more than a year, and has cut considerable ferruginous slate, some paint rock, and some ore averaging under 50%. There is evidently an ore bearing formation running southwest through that district, crossing the Northern Pacific road near Kimberley and continuing indefinitely.

Sellwood Group.—Several of the Sellwood mines that have been idle during the winter as the result of Drake, Bartow & Co.'s actions, are resuming, and the rest will shortly. These mines are now handled through Tod, Stambaugh & Co., Cleveland, who have had the Biwabik only among Mesabi properties. The Cass, of the Sellwood group, has begun in a small way, with 20 men cleaning out underground. The La Rue, another, is showing signs of activity. At the Leetonia, west of Hibbing, stripping starts in a few weeks. The last is a more important mine than has been realized, and its cost of production is exceedingly low, while its ore is excellent.

MONTANA.

CASCADE COUNTY.

Broadwater.—David Williams & Co. are leasing on this property and reported taking out shipping ore.

Hartly.—This mine, near Neihart, has made regular shipments for over a year. A complete hoisting plant and pump are now being installed. The shaft is to be sunk from 200 to 500 ft. deeper. William Muller is interested.

London.—Roehl Bros. are reported to have opened pay ore in the new tunnel being run to open the mine at depth.

Silver Belt.—D. L. S. Barker has purchased a gasoline hoist and pump, to be used in the tunnel in sinking and prospecting below the present levels.

(From Our Special Correspondent.)

Anaconda Coal Co.—The coking and coal washing plant at Belt, after a shut down lasting five months, will start work. One hudred coke ovens will be put in commission. The smelters at Great Falls and Anaconda will be supplied from these ovens.

FLATHEAD COUNTY.

(From Our Special Correspondent.)

Kintla Lake Oil Co.—Drilling is under way, the present well, down 1,200 ft., is to be continued to 2,000 ft. The company has met many difficulties, the well being 60 miles from the railroad and the source of supplies.

LEWIS & CLARKE COUNTY.

(From Our Special Correspondent.)

Gold Bond Mining Co.—James Winscott, G. D. McKay and E. S. Hobbs, of Helena, have filed articles of incorporation. The principal office is to be at Helena, with a branch at Aurora, Ill. The company will work the Winscott group, three miles south of Helena, and the Good Cheer group, on Maupin gulch, in Jefferson county. The capital stock is $2,000,000 in $1 shares.

PARK COUNTY.

Precious Metals Co.—G. R. Tuttle, president of this company, is reported to have stated that two smelters are to be installed at Cooke this summer. A big sawmill will also be erected to get out lumber for the new buildings. It is stated that 100 men will be put to work.

(From Our Special Correspondent.)

Kimberly Montana Gold Mining Co.—A rich strike of gold ore is reported in the Siwash claim. H. L. Ryan, of Chicago, representing the Chicago stockholders, and E. L. Hickson, of St. Louis, N. B., representing the New Brunswick stockholders, are at Jardine, inspecting the property. The stamp mills and both cyanide plants are in operation.

SILVER BOW COUNTY.

(From Our Special Correspondent.)

Butte Copper Mining & Smelting Co.—The shaft on the Dutton claim is to be sunk 250 ft.

deeper and heavy machinery is being installed. A contract has been made with the Pittsmont smelter for all the product of the mine.

Germania.—This old silver producer, after some years of idleness, is in operation. The water is about out of the lower workings. The property is southwest of Butte and has had a great record.

NEVADA.

LINCOLN COUNTY.

Nevada Keystone Mining Co.—This company, of Los Angeles, Cal., may erect a light and power plant about 12 miles from its mines, in the Yellow Pine district. Carl F. Schader is general manager.

(From Our Special Correspondent.)

Nevada Park Mining Co.—This company was recently incorporated with the following officers: Jesse Knight, president; Lafayette Holbrook, vice-president; R. E. Allen, secretary and treasurer, who with S. A. King and J. J. Knight are directors. The property consists of 13 claims, in the Silver Park mining district, 35 miles north of Pioche.

OREGON.

BAKER COUNTY.

Alpine.—A snowslide completely demolished several buildings on this property in the Cable Cove district, near Sumpter. No one was injured.

Chloride.—All the buildings on this property in the Rock Creek district, near Sumpter, were swept away by a recent snowslide. No one was at work at the time.

JOSEPHINE COUNTY.

Comstock Mining & Milling Co.—This company, headed by J. Monroe Layman, has acquired several claims in the Canyon Creek district, and is reported to have uncovered some promising ledges.

Tellurium.—Another rich strike is reported at these mines, in the Canyon Creek district, above Grant's Pass.

MALHEUR COUNTY.

Uncle Sam.—This group of 10 claims near Malheur has been taken over by G. S. Stanley for Cadillac, Mich., men. It is intended to build a 20-stamp mill. A hoist of 20 h. p. is being put on the shaft, that is 160 ft. deep.

PENNSYLVANIA.

ANTHRACITE COAL.

A section of West Scranton, 40 acres in extent, is said to have settled soon after midnight, February 26, owing to a mine cave-in. Several houses were wrecked. The damage was caused by the settling of the surface over the Diamond vein of the Bellevue colliery of the Delaware, Lackawanna & Western Co.

Cameron.—Fire broke out, February 27, in this colliery, operated by the Mineral Railroad & Mining Co., causing the plant to suspend operations and throwing 1,400 men and boys out of employment.

Delaware & Hudson Co.—Baltimore No. 3 breaker was destroyed by fire March 1. It is believed that the fire was of incendiary origin. The breaker was valued at $50,000.

Mary D. Coal Co.—This company, at Tuscarora, will have a coal output of 1,000 tons per day prior to the summer of 1906. Houses are to be erected for 500 mine employees, and the Lehigh Coal & Navigation Co. will build a railroad 1.5 miles long.

BITUMINOUS COAL.

At a convention of the miners of the Cambria and Clearfield districts held at Lilly, Pa., recently, wages were demanded for the year, beginning April 1, as follows: The present rate of 66c. per gross ton for pick mining for another year; the differential between pick mining and machine mining be made 7c. instead of 16c, making the price 59c. for machine mining; the scale for day labor as decided by the interstate agreement giving drivers $2.56 per day instead of $2.40, and a corresponding advance in other classes of day labor. The convention also asks for a regular scale of pay for dead work in each sub-district because of the different conditions.

Ashville Coal & Coke Co.—H. Clay Chisholm, Edwin G. Jones and William W. Chisholm, all of Huntingdon, Pa., have organized this company, which owns coal lands in Cambria county. The company is capitalized at $50,000.

Ellsworth Coal Co.—This company, at Ellsworth, agreed to pay union wages, and the striking workmen have returned to work. The 1,500 non-union miners employed by the company struck February 1, owing to a reduction of wages.

UTAH.

BEAVER COUNTY.

Newhouse Mines & Smelters Co.—At the New York office of Samuel Untermyer a contract has been closed between this company and the American Smelting & Refining Co. It is said to involve the handling of the output of the Cactus mine. The contract covers a period of ten years. It is stated that mills are in process of construction on the property with a daily capacity of 1,500 tons, and smelting operations are expected to be begun the latter part of this year. An agreement has been closed with Senator Clark's San Pedro Railroad for a spur from Frisco to Newhouse, where the mines are situated.

JUAB COUNTY.

(From Our Special Correspondent.)

Tintic Shipments.—For the week ending February 26, shipments aggregated 149 car loads, as follows: Centennial-Eureka, 52; Tintic Iron, 12; Ajax, 1; Grand Central, 24; Lower Mammoth, 12; Carisa, 1; Salvator, 1; Yankee Con., 3; Uncle Sam, 4; Bullion-Beck, 12; Gemini, 26; Eagle and Blue Bell, 1.

Raymond Mining Co.—The stockholders have ratified the action to consolidate with the Illinois Mining Co. The Raymond-Illinois Mining Co. will be organized with a capital of $400,000. In the allotment $150,000 in shares goes to the Illinois shareholders, and the balance to those in the Raymond company.

PIUTE COUNTY.

(From Our Special Correspondent.)

Gold Development Co.—A contract has been let to run a 3,000-ft. tunnel in the Log Cabin group.

SALT LAKE COUNTY.

(From Our Special Correspondent.)

American Smelting & Refining Co.—Plans are said to be under way for the early construction of a great copper smelter at Murray, the location of the present plants of the company.

Butler-Liberal.—The machinery for the new compressor plant is being installed, and will be ready for commission in about two weeks.

Bingham Consolidated.—During the week ending February 26 the shipments of copper bullion amounted to about 181,000 lb.

United States Lead Smelter.—The excavations for this new plant have been completed near the copper plant at Bingham Junction. The American Bridge Co. will furnish 750,000 lb. of structural steel. Three stacks will be installed, provision being made for as many more. The United States will go into the market for lead ores in competition with the American Smelting & Refining Company.

United States Smelter.—Shipments of copper bullion for the week ending February 26 amounted to 302,500 lb.

Utah Consolidated Smelter.—Shipments of copper bullion for the week ending February 26 amounted to 236,108 lb.

Utah Copper Co.—The new 500-ton concentrator is in operation.

TOOELE COUNTY.

(From Our Special Correspondent.)

Honerine Mill.—This new plant is in commission. The capacity is 450 tons of ore per day.

WYOMING.

LARAMIE COUNTY.

Colorado Fuel & Iron Co.—This company is preparing to extend its mining operations at Sunrise, in the Hartville iron range. The company is sinking a big three-compartment shaft 10 by 20 ft., in addition to its surface operations on the Sunrise group, from which nearly 1,000,000 tons have already been taken by open cut and terrace mining. The new shaft is now down 400 ft., and is well equipped. The company recently purchased three new boilers and a large hoist. It is also announced that the company will put down another shaft in the next gulch northeast of the Sunrise. F. R. Ahbe is general manager of the mines.

FOREIGN MINING NEWS.

CANADA.

BRITISH COLUMBIA—BOUNDARY DISTRICT.

Boundary Ore Shipments.—For the week ending February 20, shipments amounted to 17,004 tons, as follows: Granby, 11,610; Mother Lode, 3,104; Emma mine, 561; Senator, 264; Oro Denoro, 1,155; Athelstan, 280; Elkhorn, 30 tons. Total for the year to date, 116,963 tons.

Granby Smelter.—This smelter, at Grand Forks, is running full blast, and the six furnaces are smelting about 2,000 tons per day, with ore in sight to keep them running full capacity.

Senator.—The Granby Co., which bonded this claim some months ago, has 14 men at work, and is shipping one car a day to the smelter.

BRITISH COLUMBIA—ROSSLAND DISTRICT.

Rossland Ore Shipments—For the week ending February 20, shipments amounted to 9,778 tons, as follows: Le Roi, 5,378; Centre Star, 1,350; War Eagle, 1,200; Kootenay, 210; Jumbo, 350; Le Roi No. 2, 750; same, milled, 340; Spitzee, 200.

For the week ending February 27, shipments aggregated 9,466 tons, as follows: LeRoi, 5,876; Centre Star, 1,440; War Eagle, 960; Kootenay, 50; Jumbo, 175; Le Roi No. 2, 590; same, milled, 340; White Bear, 35. Total for the year to date, 74,467 tons.

War Eagle—The annual report of this mine for 1903 shows a net profit of $30,340. The ore sales during the year were 60,093 tons, averaging $13 full assay value, or $9.87 smelter's gross assay value. The average assay contents were: Gold, .418 oz.; silver, 1.02 oz.; copper, 1.45%. The present reserves of smelting pay ore are estimated at about 20,000 tons, averaging $10 smelter's gross assay value. The past development of the mine has shown large bodies of ore too low in grade for smelting, but which would yield a profit to successful milling. Now that the mill of the Rossland Power Co. assures an outlet for these ores within a few months, their contents will soon be available.

NEW CALEDONIA.

Exports of mineral from New Caledonia are reported by the *Bulletin du Commerce*, of Noumea as follows, in metric tons:

	November.	Eleven months.
Nickel ore	5,069	67,770
Cobalt ore	526	7,393
Chrome ore	6,370	12,204

November shipments included one cargo, 3,548 tons, chrome ore to Philadelphia.

NEW ZEALAND.

The Mines Department reports the exports of gold and silver from the colony, in December and the year, as follows, in ounces:

	Gold.		Silver.	
	1902	1903.	1902.	1903.
December	64,071	49,794	82,557	59,263
Year	508,045	533,314	673,980	860,463

The increase for the year was 25,269 oz. gold and 186,477 oz. silver. The gold bullion reported in 1903 was equal to 479,798 oz. fine gold, or $9,917,444 in value.

MINING STOCKS.

(Full quotations given on pages 384 and 385.)

New York. Mar. 2.

Presumably pool operators are not ready yet to instill new life into the stock market, though an occasional spurt in the specialties seems to hint at an early crusade. The copper shares received comparatively little attention this week, although the local injunction against Amalgamated was vacated and the stock subsequently advanced from $45⅝ to $47.375. Later, however, a reaction to $45.75 on limited sales was noted. On Tuesday there was a recovery to $47⅜, partly because certain people calculate that the collection of the delinquent dividends on the stocks of subsidiary companies will permit the Amalgamated to increase its own rate. Considering that Amalgamated has had costly litigation and may have much more, suggests that the directors may find it expedient to postpone action on the question of paying a larger dividend than 2% per annum. Anaconda is seldom heard on 'change, few transactions being reported at $16.25@$16.

On curb, Greene Consolidated of Mexico has temporarily lost interest for brokers. After selling large blocks of "rights" at $2@$1 per 100, it was learned that at the meeting on February 27, 98% of the new stock issue of $1,440,000 was subscribed by regular stockholders. This leaves only 2% for the underwriting syndicate. Not many shares were sold this week, although the price advanced to $10.375. White Knob, of Idaho, shows better form at $7.25@$8.50.

The plan to consolidate the British Columbia and Snowshoe properties has failed, although British Columbia stockholders had deposited 220,332 shares of the total issue of 265,100.

Gold and silver shares were in fair request. Standard Consolidated, of California, moved at $2.55; Ontario Silver, of Utah, at $4.50; Portland, of Cripple Creek, Colo., at $1.90, Consolidated California and Virginia, of Nevada, at $1.75@$1.55; Mexican at $1.75@$1.80, and Ophir at $4.60. Other sales were made at proportionate prices.

Recent auction sales were 450,000 shares Homestead Mining Co., at $50 for lot; 86,000 shares Mt. Sopris Mining & Drainage Co., at $25 for lot, and 2,080 shares at $10; 100,000 shares Bushwhacker Mining Co., at $50 for lot; 28,000 shares Cowenhoven Railway, Tunnel & Drainage Co., at $500 for lot; $10,255 50-100 demand notes of Bushwhacker Mining Co., as follows: $750, dated Sept. 9, 1895; $500, Jan. 10, 1896; $1,500, Jan. 10, 1896; $1,700, Jan. 20, 1897; $2,018.30, Jan. 30, 1897; $772.20, Jan. 23, 1901; $3,015, Jan. 25, 1901, and 75,000 shares Rock Hill Consolidated Gold & Silver Mining Co., $10 for the lot.

Boston. Mar. 1.

(From Our Special Correspondent.)

Dullness is again the predominating feature in this market, although there has been a firm undertone, due chiefly to no offerings of stocks. The increase in the Wolverine dividend and the favorable annual report of the Osceola ought to exert a good influence in copper shares. A little more activity has been displayed in Copper Range Consolidated, and the price has enhanced $2, to $40. Utah was well bought to-day, and advanced to $34. The buying is said to be from New York. It is noticed that this stock now moves on about the same lines as Amalgamated Copper.

The favorable news from the Kearsarge lode, now being so extensively explored in the Lake district, is calling attention to some of the lesser mines, such as Centennial, Mohawk, Ahmeek, and Atlantic. Thus far this fact, however, has not been reflected in the market for these stocks. Allouez quoted at $3.75, Mass at $3.875, Michigan at $4.50 and Victoria at $3, are being quietly picked up. Wolverine has advanced $3, to $73, on the increase of the dividend to $3.50. Atlantic holds around $7.50. The annual report, issued this week, is remarked upon as showing what a low grade mine can do. The average yield of the rock treated was 12.76 lbs. fine to the ton, yet the company earned a surplus of $153,341 for 1903, bringing the total surplus up to $244,443. Osceola has been very dull, with sales of odd lots at $55@$56. The annual report, issued to-day, is very encouraging to stockholders, showing a surplus of $357,585 for 1903. This is quite in contrast to the deficit of $793,759 for 1901, when two $3 dividends were paid. The company got 174 lbs. of refined copper per ton of rock stamped. The cost per pound of copper was 10.29c., including all expenses. Mohawk has advanced $1, to $35.50, and Centennial is up a fraction, to $17.37½. Calumet is strong at $440@$445. It is remarked that Russia uses Calumet's product almost to the exclusion of all other brands. The annual report of the Washington Copper Co. states that no work was done last year. The company has $3,859 cash on hand, which is sufficient to meet the small yearly expenses. There is no ground for the report that the Trinity is to consolidate with the Phoenix property.

Colorado Springs. Feb. 26.

(From Our Special Correspondent.)

The close of this week finds the market for mining securities on the local exchange active. An undercurrent of strength manifested itself the first of the week, the result of which was a general and gradual advance in quotations. The higher-priced stocks seemed to be the most popular, and the advances scored by them were marked. The volume of trading has increased steadily, and the outlook for the coming week is encouraging.

The executors of the Stratton estate have just announced that none of the properties belonging to that estate will be leased, but will be worked by the estate itself. While this will be disappointing to the small army of leasers, who were endeavoring to secure leases on this property, it will, nevertheless, be a welcome announcement to every one interested in the Cripple Creek district, as it insures the opening up of several hundred acres of valuable mineral lands, out of which a number of producing mines will undoubtedly be brought. The camp is becoming more active in all sections, and renewed interest in mining properties and mining stocks will follow.

Salt Lake City. Feb. 27.

(From Our Special Correspondent.)

The sales for the week on the Salt Lake Stock & Mining Exchange brought $23,608.18. While the market has been slow, the week closes with some advances noted. Consolidated Mercur and Yankee Consolidated were on the ascendency, both making substantial gains. The slimes plant at the Mercur is in commission, and the management believes the past difficulties are over. Three out of the four Moore separators are working, each having a daily capacity of 175 tons of ore. Toward the close considerable inquiry was made for Little Chief, of Tintic district, where encouraging strikes have been made on the 800-ft. level. Park City stocks have been in little demand. Daly-Judge held up to above $4 a share, and Daly-West was steady at $34@$34.50. February closed with a dividend record of $257,500, as follows: Daly-West, $117,000; Silver King, $100,000; Grand Central, $25,000; Century, $3,000; Annie Laurie, $12,500. Sacramento will resume payments next week at $5,000.

San Francisco. Feb. 25.

(From Our Special Correspondent.)

The market has been rather quieter this week for Comstock shares, principally owing to the comparative weakness of Ophir, which took down most of the others with it. Ophir sold down to-day to $4.50. Consolidated California & Virginia was quiet, at $1.60; Mexican, $1.65; Sierra Nevada, 50c.; Potosi, 19c. per share.

On the San Francisco & Tonopah exchange, business was better than last week, but prices were not specially strong. Montana Tonopah sold at $1.35@$1.40; Tonopah Belmont, 50c.; Tonopah Midway, 40c.; McNamara, 20c. per share.

On the California exchange business in oil stocks was rather quiet, but prices were fairly steady. Home Oil sold at $1.20@$1.25; Illinois Crude, $1.05@$1.10; Monte Cristo, 80c.; Sovereign, 44c. There was a good deal of dealing in Associated Oil stocks.

San Luis Potosi. Feb. 23.

(From Our Special Correspondent.)

Exchange on New York has receded from 216 to 208, but closed on Saturday at 211.

Dealings in mining stocks, though not brisk, were more active than they have been for some time. Of those more in demand, in El Oro, Victoria brought $183, Mexican; Dos Estrellas, $1,705; Old Abe, $3.75; Noche Buena, $10; Chihuahua, $9; Buen Despacho, $44; Santa Rosa, $3; in other camps Augustiacs, $55; Amistad y Concordia, $82; Santa Gertrudis, $85; Santa Maria de La Paz, $160, and Providencia San Juan de La Luz, $60.

COAL TRADE REVIEW.

New York, Mar. 2.

ANTHRACITE.

In a wholesale way the anthracite coal trade is just now more active than at any time this winter. This is because the prolonged cold weather has exhausted the supplies laid in last summer and fall by many dealers. A few days of warm weather may affect retail buying, but the wholesale trade can reasonably expect a very fair demand for two weeks yet; after that, of course, business will be strictly on a hand-to-mouth basis, in anticipation of the reduction in prices on April 1. The winter breaks all records in the history of the weather bureau for continued cold weather, and in spite of the aid it has given the coal trade, producers and dealers will hardly regret its passing.

At the head of the lakes the movement of coal from docks has been somewhat better, as the railroads are digging out side-tracked cars. Arrivals of coal all-rail from Chicago are also freer. The demand for anthracite has fallen off somewhat, owing to the approach of warmer weather, but business is still good. In Chicago territory wholesale trade is active; in fact, better than at any time this year. The movement of coal to out-of-town yards has improved; the demands of country yards cannot always be filled promptly. Arrivals of all-rail coal are improving. Supplies on docks are getting low, and will be very much lower when navigation opens than was anticipated last December. Along the lower lakes and in Canadian territory more snow has come to disarrange train schedules, and the blockades at such points as Syracuse and Niagara Falls are as bad as ever. Along the Atlantic seaboard the coastwise movement of coal is improving somewhat, as harbors get clear of ice. Stocks at loading ports are reported generally cleaned up. There has been an increase in demand from points beyond Cape Cod, where prices are firm and the market active. At New York the small steam sizes are wanted, and sell at full prices.

BITUMINOUS.

Consumers in the Atlantic seaboard bituminous trade are actually short of coal. This is apparently because all railroads have fallen down in their efforts to get coal from the mines to tidewater; the Pennsylvania according to all accounts has fallen hardest. As a result, not only is there a shortage of coal arriving at tidewater, but a poor car supply at the mines, which does not permit any replenishing of coal now on the way. This means an absolute shortage, which, without regard to any sentimental effect, must last a week longer, even should the railroads deliver at once and regularly, a good supply of cars at the mines. In general it may be said that demand is increasing. Stocks are depleted and consumers are desirous of adding to them. The uncertain outlook due to the attitude of organized labor is increasing the slightly feverish tone of the market.

We understand that all the main line roads have named the same through rates from the mines to tidewater as last year.

Trade in the far East shows a better demand, consumers making inquiries, not only of their regular dealers, but also of others. Along the Long Island sound the market is active and is calling for more coal than can be delivered. Demand from this territory, however, is to a slight degree, sentimental, being affected by the inability to get coal promptly and the uncertain outlook at the mines. At New York harbor points trade is quite active, and there is little coal to be had. Prices have risen to around $3, f. o. b.

New York harbor shipping ports for Clearfield grades. A few days more of present condition will see prices advancing to $3.25.

Transportation from the mines to tidewater is slow, what coal is on the road coming through within about 10 days, but irregularly. Car supply at the mines averages 25% of the demand. In the coastwise vessel market vessels are in better supply at New York harbor than they were. In Delaware and Chesapeake bays the ice is breaking up, and a strong off-shore wind will take it out, unless the temperature falls unexpectedly low. Baltimore has been more or less ice bound for 60 days, and the ice in the bay has been the heaviest for 30 years. Rates from Newport News and New York harbor points are around $1.25 to points beyond Cape Cod and $1.10 to Long Island sound points.

Birmingham. Feb. 29.

(From Our Special Correspondent.)

The Alabama coal trade is in a very satisfactory condition from all reports. The production is heavier now than it has ever been, and there is a steady shipment. The most important occurrence during the past week was the purchase of a majority interest in the Ivy Coal & Coke Co., with mines and coke ovens in Walker county, by G. B. McCormack and Erskine Ramsey. The Ivy Co. is capitalized at $500,000, and several mines are operated in the vicinity of Dora (Horse Creek), on the 'Frisco system. It is understood that the deal just consummated involved an amount approaching $400,000. The Dora mines are the largest in the State employing non-union miners and mine laborers. Messrs. McCormack & Ramsey are interested in extensive coal properties in the western part of Jefferson county, now undergoing extensive development. The recent purchase makes them almost the largest, if not the largest, coal operators in the State. Mr. Walter Moore, vice-president and general manager of the Ivy company, sold out almost his entire holdings in the concern, and for a while will remain with the new purchasers in his old capacity.

Chicago. Feb. 29.

(From Our Special Correspondent.)

Steady buying of anthracite has prevailed in all parts of Chicago territory, making the week a good one for wholesalers. Notwithstanding warmer weather over the Middle West, the demand continues good, indicating the exhaustion of stocks laid in at the beginning of winter by retailers and consumers, and future reliance on sales through the Chicago market. There is much complaint about delays in shipments, of both anthracite and bituminous, but the situation is not nearly so bad as a year ago. Anthracite continues to sell at $6.50 in cars, and the city retailer gets $7.75. Dock stores of anthracite are said to be large enough to make it probable that the bulk of the trade will be supplied from them and the proportion of all-rail shipments will be no larger than in normal years.

Bituminous is in good demand for all grades, from screenings to prepared sizes. Western mines are getting on a firm basis again, with the oversupply so marked a few weeks ago disappearing. The demand for Eastern coals is better for everything, except smokeless, and even this is not losing ground. Buyers are looking eagerly for lots of all grades that can be quickly delivered and these lots command slight premiums. Quotations remain about the same as last week, though slightly higher on some grades. Hocking holds up well to the $4 mark, with some coal sold at 40c.@50c. less; the demand for it is increasing. Smokeless brings $3.40@$3.60; Indiana and Illinois run-of-mine is in large demand at $1.90@$2.20, and screenings, $1.60@$1.80. Activity is greatest, as heretofore, in Illinois and Indiana coal.

Cleveland. Feb. 29.

(From Our Special Correspondent.)

Coal.—The coal situation hinges upon the results of the joint conference of the miners and operators now in second session in Indianapolis. The railroads are anticipating a rupture, and the tendency to protect themselves is already beginning to show in a car congestion already becoming acute on account of the weather. Coal of all grades is already scarcer. In this market the accumulation by the railroads is already felt. Prices are quoted at Cleveland as follows: Pittsburg steam lump, $2.30; mine-run, $2.15; slack, $1.85; Ohio No. 6¾, $2.00; mine-run, $1.90; slack, $1.75. The foregoing prices are an advance all round of about 5c. per ton.

Pittsburg. Mar. 1.

(From Our Special Correspondent.)

Coal.—The only new business done is for immediate requirements, owing to the uncertainty due to the probable disagreement on the mining rate. There is talk of a strike in the bituminous coal fields, unless the operators agree to continue the present scale. It is reported that certain operators desire a general suspension, as they have large stocks available to sell at a profit, and could make contracts for the year at better prices. The rivers are rising again, and it is believed a large tonnage will be sent to the lower ports before the end of the week. Prices are firm and several sales of run-of-mine coal are reported to have been made at $1.40. The minimum price is $1.20.

Connellsville Coke.—A shortage of railroad cars is responsible for a falling off in shipments. Prices are firm, standard Connellsville furnace coke being quoted at $1.60 and foundry at $2 @$2.35. The production for the week was 201,064 tons, a decrease of 7,782 tons. The shipments for the week were 7,713 cars, a decrease of 702 cars, distributed as follows: To Pittsburg and river tipples, 3,198 cars; to points west of Pittsburg, 3,245 cars; to points east of Everson, 1,270 cars.

San Francisco. Feb. 25.

(From Our Special Correspondent.)

Pacific coast coals in large lots to dealers are quoted as follows: Wellington and New Wellington, $8; Richmond, $7.50; Roslyn, $7; Seattle and Bryant, $6.50; Beaver Hill and Coos Bay, $5.50; white ash, $5.25. For Rocky mountain coals, ex-car, to dealers, prices are $14 for Colorado anthracite, $11.50 for Castle Gate, Clear Creek, Rock Springs and Sunnyside. Eastern coal is still nominal at $14 for Pennsylvania anthracite, and $13 for Cumberland, with very light stocks. Foreign coal in cargo lots is quoted at $13 for Welsh anthracite, $8.50 for cannel, $7.50 for Wallsend and Brymbo.

Foreign Coal Trade. Mar. 2.

Exports of coal and coke from the United States, in the month of January, are reported by the Bureau of Statistics as follows:

	1903.	1904.	Changes
Anthracite	119,748	91,957	D.27,791
Bituminous	329,840	298,544	D.31,296
Total coal	449,588	390,501	D.59,087
Coke	20,751	32,635	I. 11,884
Totals	470,339	423,136	D.47,203

Exports of coke were chiefly to Mexico. The exports of coal were distributed as follows:

	1903.	1904.	Changes.
Canada	335,097	223,485	D.111,612
Mexico	32,686	81,839	I. 49,153
Cuba	36,701	31,881	D. 4,820
Other West Indies	28,573	20,079	D. 8,494
France	....	3,682	I. 3,682
Italy	....	1,360	I. 1,360
Other Europe	1,438	1,797	I. 359
Other countries	15,093	26,378	I. 11,285
Totals	449,588	390,501	D. 59,087

The light exports to Canada this year are rather remarkable. Some of the decrease may be due to difficulties in railroad transportation.

Imports of coal into the United States in January are reported as follows:

	1903.	1904.	Changes.
Canada	183,110	148,264	D. 34,846
Mexico	5	1	D. 4
Great Britain	299,776	15,225	D.284,551
Other Europe	300	...	D. 300
Australia	17,231	39,901	I. 22,670
Japan	...	10,292	I. 10,292
Other countries	...	6	I. 6
Totals	500,422	213,689	D.286,733

The imports in January of last year were, of course, exceptional in quantity. Of the coal imported this year, 6,013 tons were anthracite, the balance being bituminous coal.

IRON TRADE REVIEW.

New York, Mar. 2.

Conditions in the iron and steel trade do not show any material change. Finished material remains quiet, but with rather more inquiry for future deliveries. The chief incident of the week is the reported purchase of 130,000 tons of pig iron from outside furnaces by the United States Steel Corporation. The general belief was that the corporation would have enough iron from its own furnaces to supply its needs. The contracting for an outside supply indicates either that demand is better than had been supposed, or—possibly—that it was considered good policy to give the market a lift.

Imports and Exports.—Exports of iron and steel from the United States, including machinery, in the month of January, were valued by the Bureau of Statistics of the Department of Commerce and Labor at $8,171,738, against $7,437,298 in January, 1903, an increase of $734,440 this year. The principal items of these exports were, in long tons:

	1903.	1904.	Changes.
Pig iron	1,431	6,742	I. 5,311
Bars	2,499	3,035	I. 536
Rails	454	4,960	I. 4,506
Sheets and plates	610	1,627	I. 1,017
Structural steel	2,699	2,340	D. 359
Wire	6,414	7,584	I. 1,170
Nails	2,408	3,275	I. 867

There were no exports of iron ore this year, against 385 tons in January last year.

Imports of iron and steel in January were valued at $1,959,132, against $4,948,417 in January, 1903, showing a decrease of $2,989,285. The principal items of these imports were as follows, in long tons:

	1903.	1904.	Changes.
Pig iron	110,679	10,812	D.99,867
Billets and blooms	38,709	1,860	D.36,849
Scrap iron and steel	12,803	827	D.11,976
Bars	4,598	2,781	D. 1,817
Rails	5,405	1,740	D. 3,665
Wire rods	1,888	1,320	D. 568
Tin-plates	5,298	5,432	I. 134

All classes of imports, except tin-plates, show large decreases. The imports of iron ore were 29,594 tons, against 67,375 tons in January, 1903, a decrease of 37,781 tons.

German Iron and Steel Trade.—German exports of iron and steel in the past year are returned officially at 3,337,514 tons, which is an increase of 151,264 tons, or 4.7% on the exports of the previous year. This increase, although large, is not nearly so great as that in the year 1902, when the exports were 1,061,000 tons in excess of those of the previous year. The principal items of exports are shown below in metric tons:

	Tons. 1902.	Tons. 1903.
Pig iron	347,256	418,072
Merchant iron and steel	743,338	769,860
Rails and railway material	415,775	449,940
Railway rolling stock material	47,491	48,385
Ingots, blooms and billets	636,427	638,182
Plates and tin plates	283,658	293,228
Wire and wire ropes	236,644	257,925

The exports to Great Britain and her possessions (including India) were 1,043,768 tons in 1903, against 966,000 tons in the previous year, so that the British Empire absorbed nearly one-third of the total volume. Great Britain alone took 822,837 tons of German materials in 1903, against 763,015 tons in the previous year. Belgium increased her imports of German iron and steel from 398,687 tons in 1902 to 448,935 tons in 1903. On the other hand, France only took 71,519 tons in 1903, nearly one-half being in the form of pig iron.

Birmingham. Feb. 29.

(From Our Special Correspondent.)

The only encouragement the Southern pig iron manufacturers have found in the iron market in the past week was an improvement in the inquiry and indications that consumers were in need of iron. Prices have declined on iron for second quarter delivery, and No. 2 foundry is easily obtained at $9.50 per ton, and a rumor prevails that $9.25 will procure the product.

Furnaces in this district are breaking records. No. 3 furnace of the Republic Iron & Steel Co., at Thomas, which has been put in operation again, after having been thoroughly repaired, during the first week of its operation turned out 1,300 tons of iron, much of which was Nos. 1 and 2 soft and Nos. 1 and 2 foundry.

The big steel plant at Ensley, belonging to the Tennessee Coal, Iron & Railroad Co., is requir-

ing no small amount of iron, while some iron is being handled in the rolling mills, cast iron pipe foundries and other industries right in the Birmingham district.

The following quotations are given: No. 1 foundry, $10; No. 2 foundry, $9.50; No. 3 foundry, $9; No. 4 foundry, $8.50; gray forge, $8.25@$8.50; No. 1 soft, $10; No. 2 soft, $9.50.

There is a good demand for cast iron pipe and factories in this section are working steadily.

The Tennessee Co.'s plant at Ensley is working on orders for steel rail which will aggregate no less than 60,000 tons, much of which will be laid in Alabama. The steel plant is almost with a full complement of men. The requirements of pig iron are met easily from the Ensley furnaces, belonging to the same company.

Chicago. **Feb. 29.**

(From Our Special Correspondent.)

There is no tendency toward higher prices on pig, but a strong probability that the $9.50 minimum Birmingham ($13.35 Chicago) for No. 2 Southern, has been cut somewhat on large orders. This partially explains the comparatively large buying last week. The trade, however, has reached the point where good-sized sales are necessary if foundries are to keep running. In consequence, there is a marked increase in the size of the lots bought, though many buyers are conservative yet.

The belief is still expressed by consumers that the bottom of the market has not been reached, and while this feeling exists, free buying cannot be looked for. There is again talk about a combination of Southern producers, for the holding up of prices, but it does not appear probable that such a result can be brought about in the local market, where independent producers of Southern have always had a strong foothold.

Northern remains in steady demand, with $13.50 generally quoted for No. 2, but with the probability that this price is shaded on some orders. Coke is held back somewhat by transportation delays, but there is enough in the market for all immediate needs, the price being $4.90@$5.00.

Cleveland. **Feb. 29.**

(From Our Special Correspondent.)

Iron Ore—The ore producers made another effort this week to reach an understanding on prices for the year, but failed, and there seems little prospect of an adjustment of the radical differences between the leading interests and the smaller producers. Only time will tell. The meeting held in this city on Monday adjourned without date for another call. There is still a possibility that the interests concerned may come together again before shipping commences, but the probability of a satisfactory adjustment seems very remote.

Pig Iron.—The pig iron market has a distinctly better tone, due to the announcement of the United States Steel Corporation's order for 130,000 tons of pig on the basis of $13. The filling of this order will require the combined output of the furnaces in the Mahoning and Shenango valleys. With prices for No. 2 a shade lower, the Southern furnaces are still far from sharing in this market. Consumers are coming forward a little more readily.

Old Material.—A sale of old iron rails is reported at $20, an advance of $4 per ton. Other quotations are nominally unchanged.

New York. **Mar. 2.**

Pig Iron.—Recent cuts in prices have not stimulated buying much; some sales are reported. We quote at tidewater as follows: No. 1 X foundry, $15.30; No. 2 X, $14.25@$14.75; No. 2 plain can be had for $1 less; while gray forge is selling around $13.25. For southern irons on dock quotations are: No. 1 foundry, $13.50; No. 2 foundry, $13; with lower grades in proportion. No. 1 soft can be had at about $13.50, and No. 2 soft at $13.

Bar Iron and Steel.—Prices are firmer. Refined bars are quoted at around 1.45c., in large lots, with steel at about the same. Common iron bars are as low as 1.30c.

Plates.—The market for small lots is fairly good. Sheared plates are quoted as follows: Tank, 1¼-in. and heavier, 1.76@1.80c.; flange, 1.95@2.05c.; marine, 2.10@2.15c.

Steel Rails.—The quotations remain $28 for standard sections, f. o. b. mills; light rails, $33@$36, according to weight.

Structural Material.—The local demand has not improved as yet. Large lots at tidewater are still quoted at 1.75@2c. for beams, angles and channels.

Philadelphia. **Mar. 2.**

(From Our Special Correspondent.)

Pig Iron.—The most unsettling factor in this market is Alabama iron, which is still sold under $9.50. It is given out here that some shadings will be made in transportation, which may enable the Alabama people to make more trouble. The actual business done during the past six days is insignificant, and the unsatisfactory market is likely to continue. Sales agents are taking a philosophical view, saying that after all there is very little improvement in the general situation over months ago. We are doing very little in basic, but something in No. 1 X foundry, while forge is attracting no attention. Quotations are more unsettled than last week, owing to the competition of Southern iron. No. 1 X is held at $15.50; No. 2 X, $14.50; No. 2 plain, $14; Southern No. 2, $14; by rail, and $13.50 on dock; gray forge, $13.50 for standard. Light stocks at northern furnaces count for nothing with southern iron on the warpath.

Billets.—Transactions in billets are larger in number, but smaller in quantity than last week. All that have occasion to use billets are watching the market a little more closely. The price paid this week was $25.

Bar Iron.—Scrap has moved up, and indirectly reflects on bars. Steel bars have been doing better ever since the harmonizing of prices, and business was booked this week in a small way at 1.50c.@1.55c., delivered. Refined bars are quoted as low at 1.40c.

Sheet Iron.—Sheet iron makers are in receipt of inquiries from some of their old customers, but large orders are not coming in, though the tendency of prices is upward. The manufacturers think a large March trade probable.

Plate Iron.—A good boiler plate demand, made up of small orders, is the only thing we have to report. At present ¼-in. tank steel is quoted at 1.785c., in less than car lots; boiler steel, 1.885c.; fire-box, 1.985c.; and locomotive material, 2.285c. Locomotive and shipyard requirements are large, and our locomotive works are turning out more work than ever in their history.

Structural Material.—It is reluctantly admitted that business does not come so fast as the heavy known requirements call for. Quotations are repeated at 1.735c. to 1.85c.

Rails.—Orders for rails are finding their way to mills with frequency, and in light sections there is more activity than since last autumn, with requirements springing up from unexpected sources. The rumor prevails here that orders for over 100,000 tons of standard sections are to be placed before Saturday.

Scrap.—A few holders of good scrap have put prices up to a point where they will probably not sell unless the necessities of buyers become very urgent. Heavy steel scrap is held at $13.50. Low phosphorus scrap is not to be had, but $18 is quoted. Choice railroad scrap, No. 1 wrought, would bring $16, but those who have it want $17. Some country scrap is promised next week, and will probably change hands at $15 delivered.

Pittsburg. **Mar. 1.**

(From Our Special Correspondent.)

The iron and steel markets were greatly strengthened this week through the purchase by the United State Steel Corporation of 100,000 or 130,000 tons (the amount is disputed) of Bessemer pig. It is said half of the order goes to the Bessemer Association and half to independents. The price agreed on is reported as $13, valley furnaces, a shade higher than most of the sales made during the past two weeks. Pig iron prices were slowly declining, and a week ago there were indications that Bessemer soon would be selling at less than $12.75, valley. It was known that the corporation was short of iron, but it has in blast fully 80 per cent of its furnaces, and expects to have all in operation within the month. There is considerable gossip in iron and steel circles over the big tonnage placed, and among other things it is said that while the corporation is short of iron for prompt delivery at Cleveland and Youngstown, the contract for a large amount was to strengthen the situation, and hold independent ore producers in line to maintain prices. It had been apparent for some time that the independents contemplated a large reduction or a regular open market. As the big order is for early delivery, it is not likely that the price can be duplicated for first quarter shipment, and consumers who have been taking small lots for immediate requirements only, in anticipation of lower prices, will now be forced to pay a stiffer rate. While there has been a drop in Southern foundry iron, it is not likely to have any material effect in this market. Foundry No. 2 had been offered as low at $12, valley furnaces. Gray forge was firmer, and a sale is noted at $12.50, Pittsburg. The Jones & Laughlin Steel Co. is rushing work on the new stack known as No. 5, of the Eliza group of furnaces, and it is expected to be ready to be blown in about April 1. A Pittsburg district steel concern has bought 1,000 tons of foreign ferro-manganese at $41.25, delivered here. The leading producer, the Carnegie Steel Co., sold to one company 2,000 tons. The price is supposed to be around $42.

The steel market continues to improve, but some of the finished lines are in unsatisfactory shape, notably sheets and tin plate. The demand for both iron and steel bars is excellent and large orders are being placed almost daily. The steel bar makers will hold a meeting here on March 15, and it is expected prices will be advanced. Prices of bar iron are firmer than at any time within the past four months. New business also is being received in plates and structural material, but the tonnage is not very large. The wire trade continues good, and the mills are filled with orders for one or two months ahead. The leading producer has not yet announced an advance, but it will probably do so before taking any orders for April or May delivery. Merchant pipe conditions continue good, and all the mills in this district are busy. Some large orders for steel rails are to be placed within the next few days. The rail mills have orders for probably 1,500,000 tons, part of which was held over from last year.

At a meeting of the advisory board of the Amalgamated Association of Iron, Steel and Tin Workers on Saturday, it was decided to oppose all profit-sharing plans proposed for the independent tin plate mills. The order was received at several plants yesterday where arrangements were being made to start, and caused considerable indignation among the men. It is believed that many will break away from the association in their desire to obtain employment. At the price of $3.45 a box, established by the leading producer, the American Sheet & Tin Plate Co., it is impossible for independent manufacturers to get any business at a profit, and pay the high amalgamated scale.

Pig Iron.—The market is strong, due to the Bessemer iron purchase by the United States Steel Corporation. Before the deal was completed on Saturday afternoon some small sales had been made as low as $12.75. It is not likely that less than $13.50 can be done now for delivery during the first quarter. Foundry iron, No. 2 grade, is firm at $13, Pittsburg. Gray forge is quoted at $12.75@$13, Pittsburg, but it is reported that a sale was made late last week at a lower figure.

Steel.—The pool price of $23 for Bessemer and open hearth billets is firmly maintained, but there have not been many sales of consequence. The crucible steel trade is improving, and this week every plant of the Crucible Steel Co. of America is in full operation. The company has just received a number of nice foreign orders, principally from Germany France and Italy. Steel bars are firm at 1.30c. Tank plate is in good demand and is still quoted at 1.60c.

Sheets.—Shading of prices by independent producers is again reported, and the market is irregular. The leading producer continues to quote No. 28 black sheets at 2.30c., and galvanized at 3.30c.

Ferro-manganese.—Prices continue to decline, and both domestic and foreign 80% can be had at prices ranging from $41.25 to $42.25.

BY TELEGRAPH.

It is generally reported that the amount of Bessemer pig purchased by the United States Steel Corporation was 100,000 tons. Prices of steel pipe have been advanced one point on all sizes under 7 in., or about 0.1c. per lb.

CHEMICALS AND MINERALS.

New York, Mar. 2.

Milder weather has given hope of an early improvement in transportation facilities. Some inconvenience, however, may still be caused by an inadequate supply of cars to handle the delayed traffic.

Further evidence that the American phosphate industry is being gradually centralized is noted below. This will doubtless be of international importance, since the United States exports annually a very large part of its production, which also constitutes the principal supply of raw material for European superphosphate manufacturers.

Judging from the January statistics just issued the United States is not as remunerative a field for foreign substances as it was a few years ago. During the month the consumption of the important foreign chemicals and minerals, not mentioned in the regular markets, was as follows:

	Imports.	Re-exports.	Entered for Consumption.
Asphalt, tons	7,463	389	7,065
Cement, lb	26,217,190	545,976	25,671,214
Chlorate of potash, lb	38,765	.....	38,765
Clay, etc., tons	17,085	.....	17,085
Graphite, tons	1,275	1	1,274
Salt, lb	27,074,818	52,530	27,022,288
Saltpeter, lb	224,752	133,898	90,854
Soda, caustic, lb	323,498	108,530	214,968
Soda, sal, lb	302,501	475	302,026
Soda ash, lb	1,361,600	.....	1,361,600

Domestic exports in January included:

	1903.	1904.	Changes.
Cement, lb	3,859,200	4,555,200	I. 696,000
Gunpowder, lb	69,673	12,047	D. 57,626
Lime, bbl	3,676	3,101	D. 575
Lime, acetate, lb	5,074,517	5,362,173	I. 287,656
Salt, lb	640,593	1,025,787	I. 385,194

Noteworthy changes are substantial increases in the exports of cement and salt—articles that are rapidly depreciating in quantity in the import trade.

Cyanide.—There is talk of encouraging the manufacture of cyanide direct from atmospheric nitrogen by a new, and it is claimed, a more economical and simple process than was tried at Niagara Falls. Patents are pending for this process. Cyanide is quoted in the open market at 19c.@20c. per pound.

Bleaching Powder.—Jobbers are not active just now, permitting first hands to strengthen prices at $1.20@$1.25 per 100 lb. for prime brands. Imports into the United States in January were as below, in pounds:

From	1903.	1904.	Changes.
Great Britain	6,970,096	7,795,536	I. 825,440
Ger., Bel., etc.	653,637	4,037,305	I. 3,383,668
Total imports	7,623,733	11,832,841	I. 4,209,108

The increase is equivalent to 55%, which, considering that there were no re-exports, indicates that the domestic consumption will be large this year.

Copper Sulphate.—Evidently this market intends to maintain prices, notwithstanding the intrusion of importers. Supplies are closely controlled, and makers quote $5.05@$5.10 per lb., delivered at seaboard. Exports from the United States in January were 3,096,384 lb., which is 893,162 lb. better than a year ago. Italy and Austria were the principal buyers. During the same month Great Britain exported 8,563,520 lb., showing an increase of 844,480 lb. as compared with the same month in 1903.

Acids.—Deliveries on regular contracts are better. Prices continue nominally unchanged.

We quote as below per 100 lb., unless otherwise specified, for large lots in carboys or bulk (in tank cars), delivered in New York and vicinity.

Muriatic, 18°	$1.50	Oxalic, com'l	$5.00@$5.25
Muriatic, 20°	1.80	Sulphuric, 50°, bulk, ton	13.50@14.50
Muriatic, 22°	1.75	Sulphuric, 60°	1.05
Nitric, 36°	4.50	bulk, ton	18.00@20.00
Nitric, 38°	4.75	Sulphuric, 66°	1.20
Nitric, 40°	5.00	bulk, ton	21.00@23 00
Nitric, 42°	5.50		

Brimstone.—Spot business is discouragingly small at $22.75@$23 per ton for best unmixed seconds. Futures also are not sprightly, even though importers have eased prices to $21.75@$22 for seconds. Best thirds are nominally 75c. less than seconds. Imports into the United States in January were small, only 9,073 tons, as against 25,927 tons a year ago.

Pyrites.—Trade continues to pick up, and sellers do not hesitate to shade prices. Imports from Spain and Canada into the United States in January were 24,963 tons, which is 4,651 tons less than a year ago. In the same month Great Britain imported 86,839 tons, as against 70,089 tons in January, 1903, and 63,066 tons in 1902.

We quote domestic pyrites $5 per ton for lump ore, f. o. b. Atlantic coast mines, and 9c. per unit for fines; sulphur content varies from 42@44%. Spanish pyrites, carrying from 46@52% sulphur, are quoted at 11@11.5c. per unit for lump, and 9.5@10c. for fines, delivered at Atlantic ports.

Nitrate of Soda.—Consumption continues to grow in this country, and prices are firm, being influenced partly by the strength shown in the primary market. Spot is worth $2.15@$2.175 per 100 lb., and futures, $2.125@$2.05, the lower price being for late deliveries up to December, 1904. Steps are being taken to work the virgin mineral land sold last November by the Chilean Government. The Colorado Nitrate Co., which paid £112,275 ($547,115) for the fields of Carmen-Bajo, Rincon de Benavides and San Antonio Vieja, comprising plot 8, in Tarapaca, have proposed an issue of first mortgage debentures. To do this the directors' borrowing powers are to be increased from £80,000 to £270,000.

Sulphate of Ammonia.—Southern buying is good at $3.175@$3.20 per 100 lb. for gas liquor.

Phosphates.—Statisticians figure that this year's output of Florida high-grade rock will again fall short of the export demand. Last year the deficiency was 44,000 tons. No wonder then that foreign consumers show anxiety over the recent appointment by the Dunnellon Phosphate Co. of J. Buttgenbach & Co. as their selling agents in Europe and of Ward & Co., of London, as British agents. To some people this appears to be the last tack in the sail to consolidate the principal hard rock properties in Florida. Based on last year's exports the Dunnellon and Buttgenbach companies now control nearly the lion's share of the export trade. Adding the shipments by the Dutton Phosphate Co. and by Schilmann & Bene, it is learned that practically three firms now control the foreign trade in Florida hard-rock, amounting in 1903 to 465,520 tons, nearly 60% of the annual exports of all phosphates from the United States. In the land pebble district the mines are already closely controlled, principally by Joseph Hull, while the Peace River output is regulated according to the demand of the American Agricultural Chemical Co., which owns the shares of the Peace River Phosphate Mining Co. Summed up, the whole Florida industry is controlled by practically six concerns, whose prestige in domestic and foreign markets dictates the prices that shall be asked by the few independent operators. This centralization of the phosphate industry has long ago been pointed out by the ENGINEERING AND MINING JOURNAL, and punctures the repeated denials made by so-called authorities.

It is interesting to add, judging from recent developments in the Tennessee field, in which a certain large Florida operator has secured valuable mineral land, that the time is not far distant when all high grade phosphate mines shall be owned by comparatively few influential people. No better reason for believing this can be given, perhaps, than the total absence of any valuable new discoveries of high grade rock in recent years.

The river mining in South Carolina, judging from statistics just published, is gradually disappearing. The few independent mines, hampered by low prices, are finding it more and more difficult to operate, while the Southern fertilizer combination controls its own supply of raw material.

Exports of all classes of phosphates from the United States in January totaled 50,536 tons, the smallest quantity reported in some months past. Germany and Great Britain were the largest recipients. Imports of phosphatic materials in January, principally from Belgium, amounted to 15,779 tons, somewhat more than previous months, although less than January, 1903.

Recently 500 bags of Belgian superphosphates arrived at Philadelphia.

Guano exports from Peru and Damaraland for three calendar years were, in tons, as follows:

	1901.	1902.	1903.
Peru	52,101	60,977	78,968
Damaraland	8,299	7,362	8,805
Total	60,400	68,339	87,773

The rapid increase in 1903 was due principally to the shipments of 39,683 tons high-grade guano from Lobos de Afuera, several cargoes of which came to the United States and were the first consignment to this country in many years. The bulk of the exports as above were taken by Great Britain, Germany and France.

Current ocean freight rates are about as follows:

	Shipping ports—Florida.	So. Carolina.	Algeria.
Baltic	$3.24@$3.36	$2.26	....
Continental	2.76@ 3.00	....	2.16@ 2.22
Mediterranean	3.36@ 3.60	....	....
United Kingdom	2.64@ 3.12	2.40@ 2.52	1.56@ 1.68

Prices for phosphates per ton are as follows:

Phosphates.	F. o. b.	C. i. f. Gt. Britain or Europe.
*Fla. hard rock, 77@ 80%	$6.50@ 7.00	$9.84@$10.83
land pebble, 68@73%	3.75@ 4.00	7.35@ 8.05
†Tenn, 78@80%	4.00@ 4.25	9.54@ 10.56
78%	3.75@ 4.00	.....
75%	3.25@ 3.50	.....
73@74%	2.95@ 3.20	.....
‡So. Car. land rock	3.25	.....
river rock, 55@60%	2.75@ 3.00	5.75@ 6.88
Algerian 63@70%	.....	6.98@ 7.65
58@63%	.....	6.20@ 6.66
53@58%	.....	4.95@ 5.09
Tunis (Gafsa)	.....	6.05@ 6.65
Christmas Isle, 80@85%	.....	11.75@ 12.54
Ocean Isle, 82@88%	.....	12.11@ 13.60
Somme, Fr., 70@75%	.....	10.63@ 10.77
Bordeaux, Fr., 60@65%	.....	7.60@ 7.71
55@60%	.....	6.44@ 6.55
Liege, Bel., 60@65%	.....	7.07@ 7.17

* F. o. b. Florida or Georgia ports. † F. o. b. Mt. Pleasant. ‡On vessel, Ashley River, S. C.

Liverpool. Feb. 17.

(*Special Report of Joseph P. Brunner & Co.*)

Trade generally is the reverse of brisk, but prices, as a rule, are well maintained, and in some cases show a slight improvement.

Sulphate of copper is attracting a little more attention, and prices are rather firmer at £21 2s. 6d. per ton for prompt, and £21 5s.@£21 7s. 6d. per ton for March-April, for casks f. o. b. here, less 5 per cent.

Soda ash, in tierces, is quoted as follows: Leblanc ash, 48%, £5@£5 10s.; 58%, £5 10s.@£6 per ton net cash; ammonia ash, 48%, £4 5s.@£4 10s.; 58%, £4 10s.@£4 15s., net cash, bags 5s. per ton under price for tierces. Soda crystals are steady at generally £3 7s. 6d. per ton, less 5% for barrels, or 7s less for bags, with special terms for a few favored markets. Caustic soda is steady, as follows: 60%, £8 15s.; 70%, £9 15s.; 74%, £10 5s.; 76% £10 10s. per ton, net cash. Special quotations for the Continent and a few other export quarters. Bleaching powder is slow of sale there being little doing outside of deliveries against running contracts. For hardwood, £4 5s.@£4 15s. per ton, net cash, is quoted as to market.

Chlorate of potash continues dull, at about 2¾@2½d. per lb., net cash, for English make.

Bicarbonate of soda is in moderate demand at £6 15s. per ton, less 2½% for the finest quality in 1 cwt. kegs, with usual allowance for larger packages, also special terms for a few favored markets.

Sulphate of ammonia values are again lower at £12 15s.@£12 17s. 6d. per ton, less 2½% for good gray 24@25% in double bags f. o. b. here.

Nitrate of soda is in request and dearer, holders now quoting from £10 5s. per ton for ordinary, up to £10 10s. per ton for refined, for spot lots, in double bags, f. o. b. here.

METAL MARKET.

New York, March 2.

Gold and Silver Exports and Imports,

At all United States Ports in January and Year.

Metal	January.		Year.	
	1903.	1904.	1903.	1904.
Gold:				
Exports.	$85,951	$591,567	$85,951	$591,567
Imports.	2,010,851	8,225,508	2,010,851	8,225,508
Excess	I. $1,924,900	I. $7,633,941	I. $1,924,900	I. $7,633,941
Silver:				
Exports.	3,577,881	4,618,127	3,577,881	4,618,127
Imports.	1,494,556	2,609,372	1,494,556	2,609,372
Excess	E. $2,083,325	E. $2,008,755	E. $2,083,325	E. $2,008,755

These exports and imports cover the totals from all United States ports. The figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Exports and Imports, New York.

For the week ending February 20 and for years from January 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week		$17,664	$850,555	$449
1904	$1,107,805	1,267,744	7,600,932	162,202
1903	740,933	894,525	3,090,662	142,207
1902	7,284,636	306,872	7,781,225	234,000

The statement of the New York banks—including the 56 banks represented in the Clearing House—for the week ending February 27, gives the following totals, comparison being made with the corresponding week of 1903:

	1903.	1904.
Loans and discounts	$950,156,300	$990,209,100
Deposits	956,206,400	1,027,920,400
Circulation	43,279,100	40,219,300
Specie	176,700,400	217,351,700
Legal tenders	68,303,100	71,778,600
Total reserve	$245,003,400	$289,130,300
Legal requirements	239,051,600	256,980,100
Balance surplus	$5,951,800	$32,150,200

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports. The amounts are reduced to dollars and comparison is made with the holdings at the corresponding date last year:

	1903.		1904.	
	Gold.	Silver.	Gold.	Silver.
New York Ass'd—	$176,700,400	.....	$217,351,700	.....
England—	180,227,480	.....	177,420,110	.....
France—	506,721,955	$219,229,035	468,886,265	$221,553,070
Germany—	170,090,000	59,765,000	181,445,000	63,750,000
Spain—	72,115,000	99,850,000	73,020,000	96,600,000
Netherlands—	23,495,000	33,059,500	27,164,500	33,126,500
Belgium—	16,116,665	8,058,335	15,936,665	7,968,335
Italy—	86,545,000	10,892,000	109,980,000	18,766,000
Russia—	384,975,000	37,715,000	456,760,000	39,695,000
Austria—	231,440,000	63,775,000	235,080,000	62,925,000

The returns of the Associated Banks of New York are of date of February 27, and the others February 25, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

The silver market has been comparatively quiet and steady, without any particular feature. East India holidays for the moment are contributing to the dullness of the situation. Future tendency is uncertain, depending so much upon conditions not apparent in advance.

The United States Assay Office in New York reports receipts of 31,000 oz. silver for the week.

Shipments of silver from London to the East for the year up to February 18 are reported by Messrs. Pixley & Abell's circular as follows:

	1903.	1904.	Changes.
India	£1,148,300	£2,463,239	I. £1,314,939
China	101,500	4,500	D. 57,000
Straits	58,508	38,103	D. 20,405
Total	£1,308,308	£2,505,842	I. £1,197,534

Receipts for the week were £233,000 in bar silver from New York, £3,000 from the West Indies, and £4,000 from Australia; also £110,000 in Mexican dollars from New York, a total of £350,000. Shipments were £570,000 in bar silver, and £38,300 in Mexican dollars to Bombay; total, £608,300.

Indian exchange continues strong, and the Council bills offered in London were all taken at an average of 16.17d. per rupee. Buying of silver for Indian account has been somewhat checked by the religious holidays in that country.

The coinage executed by the United States mints in February is reported by the Bureau of the Mint, Treasury Department, as below:

Denomination.	Pieces.	Value.
Double-eagles	1,767,350	$35,347,000
Eagles	4,480	44,800
Half-eagles	26,000	130,000
Quarter-eagles	32,680	81,700
Total gold	1,830,510	$35,603,500
Dollars	1,282,000	$1,282,000
Half-dollars	32,000	16,000
Quarter-dollars	652,000	163,000
Dimes	140,000	14,000
Total silver	2,106,000	$1,475,000
Nickels	447,000	22,350
Total minor	447,000	$22,350
Total coinage	4,383,510	$37,100,850

In addition to the above there were coined for the Philippines 1,075,000 5c.; 2,820,000 1c., and 5,650,000 0.5c.; a total of 9,545,000 pieces.

Prices of Foreign Coins.

	Bid.	Asked
Mexican dollars	$0.46	$0.48½
Peruvian soles and Chinese pesos	.42	.45
Victoria sovereigns	4.85½	4.87
Twenty francs	3.85	3.87
Spanish 25 pesetas	4.78	4.82

OTHER METALS.

Daily Prices of Metals in New York.

Feb. - Mar.	Silver—New York, Cts.	Silver—London, Pence.	Copper—Lake, Cts. per lb.	Copper—Electrolytic, Cts. per lb.	Copper—London, £ per ton.	Tin, Cts. per lb.	Lead, Cts. per lb.	Spelter—N. Y., Cts. per lb.	Spelter—St. Louis, Cts. per lb.
25	57¾	26 11/16	12¼ @12⅜	12 @12⅛	57⅝	28	4.35 @4 40	5.00	4.80
26	57¾	26 11/16	12¼ @12⅜	12 @12⅛	57½	28	4.35 @4.40	5.00	4.80
27	58¼	26⅞	12¼ @12⅜	12 @12⅛	....	28¼	4.35 @4.40	5.00	4.80
29	58⅛	26⅞	12¼ @12⅜	12 @12⅛	56¼	28¼	4.35 @4.40	5.00	4.80
1	57¼	26 9/16	12¼ @12⅜	12 @12⅛	56⅝	28⅛	4.45 @4.50	5.00	4.80
2	57⅞	26 11/16	12¼ @12⅜	12 @12⅛	56⅝	28 28¼	@4.45 @4 50	5.00	4.80

London quotations are per long ton (2,240 lbs.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wire-bars: the price of electrolytic cathodes is usually 0.25c. lower than these figures

QUOTATIONS ON STERLING EXCHANGE.

February 25	4.8630	February 29	4.86⅝
" 26	4.86⅜	March 1	4.86½
" 27	4.86⅜	" 2	4.86½

Copper.—The serious aspect of the political situation and the disturbed condition of the financial markets continue to have a depressing influence and act as a check on any improvement. Consumers continue to assume a waiting attitude, but, on the other hand, producers do not as yet press on the market, and stocks are considered light. The strike is still on at the Lake mines. The closing quotations are 12¼@12⅜c. for Lake copper, 12@12⅛c. for electrolytic in ingots, cakes and wire bars, 11¾@11⅞c. in cathodes, 11¾@11⅞c. for casting copper.

Exports during the month of February were again large, amounting to nearly 17,000 tons.

The market for standard copper in London, which closed last week at £57 10s., opened on Monday at £56 10s., and the closing quotations on Wednesday are cabled as £56 12s. 6d.@£56 15s. for spot, £55 12s. 6d@£55 15s. for three months.

Statistics for the second half of February show a decrease in the visible supplies of 600 tons.

Refined and manufactured sorts we quote: English tough, £59@£59 5s.; best selected, £59 15s.@£60; strong sheets, £69 10s@£70; India sheets, £66 10s@£67; yellow metal, 6⅛@6¼d.

Exports of copper from the United States, in all forms, in January are reported by the Bureau of Statistics as below, the figures being in long tons, of 2,240 lb.:

	1903.	1904.	Changes.
Copper, ingots, etc.	10,961	28,306	I. 17,345
Copper ores and matte	783	1,792	I. 1,009

The exports in January were very large. The contents of the ores and matte are not given; estimating them on the basis of values, we find that the total exports in January this year were approximately equal to 28,950 tons of fine copper.

Imports of copper into the United States, in all forms, with re-exports of foreign material, in the month of January, are reported by the Bureau of Statistics as below, in long tons:

Fine Copper:	1903.	1904.	Changes.
Imports	4,326	5,981	I. 1,655
Re-exports	13	....	D. 13
Net imports	4,313	5,981	I. 1,668
Ores and matte:			
Imports	21,626	29,985	I. 8,359
Re-exports	95	...	D. 95
Net imports	21,531	29,985	I. 8,454

The contents in copper of the ores and matte imported are given at 1,064 long tons. This makes the total net imports of copper in all forms this year approximately 7,045 long tons. Of the imports this year 4,143 tons copper and 11,965 tons ore and matte, containing 752 tons copper, came from Mexico; 820 tons of copper and 17,846 tons ore and matte, containing 310 tons copper, were from Canada and Newfoundland.

Tin.—Owing to the scarcity of spot supplies, values have been well maintained throughout the week, spot tin commanding a considerable premium. At the close we quote spot 28@28¼c.; futures, 27⅜@27½c.

The foreign market, which closed last week at £123 15s., opened on Monday at £123 10s., and the closing quotations on Wednesday are cabled as £123 15s.@£123 17s. for spot, £124 5s.@£124 7s. 6d. for three months.

Statistics for the month of February show a decrease in the visible supplies of 900 tons.

Imports of tin into the United States in January are reported as follows, in long tons, of 2,240 lb.:

	1903.	1904.	Changes.
Straits	545	874	I. 329
Australia	10	...	D. 10
Great Britain	1,959	1,091	D. 868
Holland	15	77	I. 62
Other Europe	25	15	D. 10
Other countries	..	1	I. 1
Totals	2,554	2,058	D. 496

Most of the tin received through Great Britain is Straits tin, so that the larger part of our supply is in that brand.

Lead.—The feature of the week has been an advance on Tuesday in the prices quoted by the American Smelting & Refining Co. of $2 a ton. Consumptive demand remains very satisfactory, and early deliveries are rather difficult to obtain. The closing quotations are 4.45@4.50c. New York; 4.40@4.42½c. St. Louis.

The foreign market is firm, Spanish lead being quoted at £11 16s. 3d.@£11 17s. 6d.; English, £11 18s. 9d.@£12.

Imports of lead into the United States in all forms, with re-exports of foreign lead, are reported by the Bureau of Statistics as below; the figures are in short tons, of 2,000 lb.:

	1903.	1904.	Changes.
Lead, metallic	34	290	I. 256
Lead in ores and base bullion	7,399	7,341	D. 58
Total imports	7,433	7,631	I. 198
Re-exports	4,288	5,876	I. 1,588
Net imports	3,145	1,755	D. 1,390

Of the imports this year, 7,086 tons were from Mexico, and 540 tons from Canada. In addition to the re-exports, there were 12 tons of domestic lead exported this year, against 25 tons last year.

Spanish Lead Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of February 13, that the price of silver during the week has been 14 reales per oz. Exchange has gone up 15 centimes to 34.72 pesetas to £1. Pig lead on wharf has been 64 reales per qtl., which on above exchange is equal to £11 6s. 4d. per long ton, f.o.b. Cartagena. Exports of pig lead have been 100,000 kg. desilverized to Glasgow, and 395,093 kg. to Marseilles. Other exports were 638 kg. bar silver to Marseilles and 800 tons blende to Antwerp.

Spelter continues to develop considerable strength, and values show a further advance. The closing quotations are given as 4.80c. St. Louis, 5c. New York.

The foreign market remains strong and is advancing, good ordinaries being quoted at £22 2s. 6d.; specials, £22 7s. 6d.

Exports of spelter from the United States in January were 163 short tons, against 279 tons in January, 1903, a decrease of 116 tons. Exports of zinc ore were 98 tons, against 6,497 tons last year.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of February 13, that prices remain at 65 fr. per ton for 35% blende, and 45 fr. for 30% calamine, f.o.b. Cartagena. If, however, the increase in the rate of exchange continues, and spelter remains firm, higher prices at the mines may be looked for.

Antimony is quiet and unchanged at about last week's prices: 7¾@8c. for Cookson's, 6¾@7c. for Hallett's, 6⅝@6⅝c. for United States, Japanese, Italian, French, Hungarian and Chinese.

Imports of antimony into the United States in January were as follows, in pounds:

	1903.	1904.	Changes.
Metal and regulus	397,897	220,480	D.177,417
Antimony ore	112,000	2,961	D.109,039

This shows large decreases, both in ore and in metal.

Nickel.—The price is quoted by leading producers at 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. The price for smaller lots, according to quantity, runs as high as 60c. per lb.

There were no exports of nickel reported from the United States in January. In January, 1903, the exports were 231,778 lb. of nickel, nickel oxide and nickel matte.

Platinum.—Demand continues steady, and the price is firm at $18.50 per oz.

Messrs. Eimer & Amend, of New York, quote prices for platinum in manufactured forms, as follows: Heavy sheet and rod, 72c. per gram; foil and wire, 75c. per gram; platinum crucibles and dishes, 77c. per gram; perforated wire, like cones, Gooch crucibles, etc., 82c. per gram.

Imports of platinum into the United States in January were 363 lb., against 609 lb. in January, 1903, a decrease of 246 lb. this year.

Quicksilver.—The New York price is $45.50 per flask for large lots, while a slightly higher figure is quoted for smaller orders. The San Francisco quotations continue at $44@$45 per flask for domestic orders and about $41.50 for export. The London price is £8 5s. per flask, with the same quotation asked by second hands.

The exports of quicksilver from the United States in January were 221,283 lb., against 12,847 lb. in January, 1903, an increase of 208,436 lb. this year.

Cadmium.—According to Herr Paul Speier metallic cadmium was in good demand throughout 1903. Metal containing 99.5% cadmium sold at from 675 to 700 marks per 100 kg., delivered in Berlin.

Minor Metals and Alloys.—Wholesale prices, f. o. b. works, are as follows:

Aluminum	Per lb		Per lb
No. 1. 99% ingots	.33@37c.	Ferro-Tungsten (37%)	.38c.
No. 2. 90% ingots	.31@34c.	Magnesium, pure (N. Y.)	.60c.
Rolled Sheets	4c. up	Manganese	$2.75
Alum-bronze	.20@23c.	Mangan'e Cop. (20% Mn)	.32c.
Nickel-alum	.31@39c.	Mangan'e Cop. (30% Mn)	.38c.
Bismuth	$2.10	Molybdenum (Best)	$2.00
Chromium, pure (N. Y.)	.80c.	Phosphorus, foreign	.45c.
Copper, red oxide	.50c.	Phosphorus, American	.70c.
Ferro-Molybde'm (50%)	.$1.25	Sodium metal	.50c.
Ferro-Titanium (10%)	.90c.	Tungsten (Best)	.88c.
Ferro-Titanium (20@25% N. Y.	.55c.		

Variations in price depend chiefly on size of order.

Missouri Ore Market. Feb. 27.

(From Our Special Correspondent.)

The high price for zinc ore remains at $38 per ton, with the assay basis at $33 to $35 per ton of 60% zinc. Changes in the form of light advances are occurring week after week. They take the form of raising a bin of ore here or a bin of ore there. Aside from those ores that are classed as fancy, and have been selling at the highest assay basis and at the highest straight bid basis, it is possible only by estimate to assume the ratio of advance. It may not exceed 10% on a general average. It was four weeks in changing the lowest assay basis from $32 to $33.

Lead has made another advance, this time of $1, and closing the week at $57 per ton.

Following are the shipments of zinc and lead concentrates from the various camps of the district for the week:

	Zinc, lb.	Lead, lb.	Value.
Joplin	2,871,930	426,800	$63,860
Webb City-Carterville	2,683,900	497,810	58,225
Duenweg	1,483,530	108,620	29,055
Galena-Empire	789,200	170,420	18,485
Granby	781,000	31,000	11,390
Alba-Neck	525,770	....	9,535
Carthage	380,440	22,470	7,485
Aurora	329,630	5,960	5,440
Oronogo	267,360	18,060	4,910
Carl Junction	248,530	....	4,600
Prosperity	227,810	7,120	4,290
Badger	200,290	....	3,505
Spurgeon	87,540	93,240	2,740
Cave Springs	84,160	14,620	1,845
Mitchell	43,830	3,080	875
Central City	28,480	13,520	810
Totals	11,033,400	1,412,720	$227,050
Nine weeks	87,921,040	11,044,490	$1,750,080
Zinc value, the week, $187,935; nine weeks, $1,447,745.			
Lead value, the week, 39,115; nine weeks, 302,340.			

There is still no change in the top price being paid for zinc ore, but the day is looked forward to when a raise will come. Producers who have been watching the market and studying the changes figure that ore will of necessity be higher by the middle of March. Little advances have been made week after week during this month, not in the higher grade ores, but first in the medium grades and subsequently in the lower grades, as ore has become more scarce. Prices have been advanced by 'sharp-shooting' practice. As the pressure has become more and more toward higher prices, each purchasing agent has been alert for bargains, and has made a slight raise, straining a point as to quality if the quantity is suitable. This alertness is nearing the acute stage. It began when the reserve stock slipped quietly below the 5,000-ton limit, and now it is down to 4,000 tons, and the smelters are enlarging their purchases each week. Perhaps not all of them, but those who for several months have been buying for a restricted output of metal. The demand for the metal, according to the New York and St. Louis market reports, shows a slow but a certain tendency upward—a gradually increasing demand. The extensive resumption of operations in iron by the United States Steel Corporation, the largest user of spelter in America, must have an effect upon the spelter market most desirable to the producer of spelter, and in a proportionate measure to the producer of zinc ore. It is hinted that the Steel Corporation has secured control of all the reserve spelter. It is certain that the extensive smelters dominated by the Corporation are the ones that have purchased most heavily for a month; that have been making all of the at first almost imperceptible boosts in the zinc ore market; that have either made most of the advances here and there over the district, or have by their large purchases made it necessary for the agents of competing smelters to get in the market on a higher level. On the surface the zinc ore market appears calm, but to those familiar by years of practical schooling in watching the trend of events there is apparent a strong undercurrent that presages good things for zinc. It is even hinted by some that an upheaval of prices is not unexpected, that recent events would suggest a strong probability along this line. In support of this suggestion it is recalled that two advances have been made in sheet zinc within six weeks, the last one an advance of 15c. per 100 lb. So long as over 50% of the spelter manufactured in this country is consumed in galvanizing, the ups and downs of the consumption of iron will play an important part in determining the destinies of zinc.

Average Prices of Metals per lb., New York.

Mo.	Tin.		Lead.		Spelter.	
	1903	1904.	1503.	1904.	1903,	1904.
Jan...	28.33	28.845	4.075	4.347	4.865	4.863
Feb ..	29.43	28.087	4.075	4.375	5.043	4.916
Mar..	30.15	.....	4.442	.....	5.349	....
April.	29.81	.....	4.567	.....	5.550	....
May .	29.51	.....	4.325	.....	5.639	....
June .	28.34	.....	4.210	.....	5.697	....
July..	27.68	.....	4.075	.....	5.662	....
Aug..	28.20	.....	4.075	.....	5.725	....
Sept..	26.77	....	4.243	.....	5.686	....
Oct...	25.92	.....	4.375	.....	5.510	....
Nov..	25.42	.....	4.218	.....	5.338	....
Dec...	27.41	.....	4.162	.....	4.731	....
Year	28.09	.....	4.237	.....	5.400	....

NOTE.—The average price of spelter in St. Louis for the month of January, 1904, was 4.673c. per lb.: February, 4.717c.

Average Prices of Copper.

Mo.	New York.				London.	
	Electrolytic.		Lake.		Standard.	
	1903.	1904.	1903.	1904.	1903.	1904.
Jan...	12.159	12.410	12.361	12.553	53.52	57.55
Feb...	12.778	12.063	12.901	12.245	57.34	56.57
Mar..	14.416	.....	14.572	.....	63.85	.....
April.	14.454	.....	14.642	.....	61.72	.....
May..	14.435	.....	14.618	.....	61.73	.....
June.	13.942	.....	14.212	.....	57.30	.....
July..	13.094	.....	13.341	.....	58.64	.....
Aug..	12.962	.....	13.159	.....	58.44	.....
Sept..	13.205	.....	13.345	.....	56.82	.....
Oct...	12.801	.....	12.954	.....	55 60	.....
Nov..	12.617	.....	12.813	.....	56.30	.....
Dec..	11.952	.....	12,084	.....	56.36	.....
Year	13.235	.....	13.417	.....	57.97	.....

New York prices are in cents, per pound; London prices in pounds sterling, per long ton of 2,240 lbs., standard copper. The prices for electrolytic copper are for cakes, ingots or wire bars prices of cathodes are usually 0.25 cent lower.

Average Prices of Silver, per ounce Troy.

Mo.	1902.		1903.		1904.	
	London. Pence.	N. Y., Cents.	London Pence.	N. Y., Cents.	London, Pence.	N. Y., Cents.
Jan..	25.62	55.56	21.98	45.57	26 423	57.055
Feb..	25.41	55.09	22.11	47.89	26.665	57.592
Mar..	25.00	54.23	22.49	48.72	.....	.....
April.	24.34	52.72	23.38	50.56	.....	.....
May..	23.71	51.31	24.89	54.11	.....	.....
June.	24.17	52.36	24.29	52.86	.....	.....
July..	24.38	52.88	24.86	53.92	.....	.....
Aug..	24.23	52.52	25.63	55.36	.....	.....
Sept..	23.88	51.52	26.75	58.00	.....	.....
Oct...	23.40	50.57	27.89	60.36	.....	.....
Nov..	22.70	49.07	27.01	58.11	.....	.....
Dec...	22.21	48.03	25.73	55.375	.....	.....
Year	24.09	52.16	24.75	53.45	.....	.....

The New York prices are per fine ounce; the London quotation is per standard ounce. .925 fine.

DIVIDENDS.

Company.	Latest Dividend. Payable.	Rate.	Total.	Total to date.
†Calumet & Ariz.	Mar. 19	1.50	$300,000	$700,000
*Calumet & Hecla	Mar. 22	10.00	1,000,000	84,350,000
*Cent. Eureka, Cal.	Mar. 11	.02	7,968	259,900
*Central Lead, Mo.	Mar. 15	.50	5,000	395,000
*Daly West, Utah	Mar. 15	.65	117,000	3,842,000
†Federal Sm., pf.	Mar. 15	1.75	183,750	367,500
†General Chem, pf.	Apr. 1	1.50	150,000	2,875,178
*Imperial Oil, Cal.	Mar. 5	.20	20,000	560,000
Old Gold, Colo.	Mar. 10	.005	10,000	10,000
*Penn. Con., Cal.	Mar. 15	.10	5,150	202,525
†St. Jos. Lead, Mo.	Mar. 15	.15	56,250	3,890,750
*Silver King, Utah.	Mar. 10	.66 2-3	100,000	7,650,000
†Standard Oil	Mar. 15	16.00	15,520,000	222,235,000
*Thirty-Three, Oil, Cal.	Mar. 5	.10	10,000	270,000
‡Wolverine Copper.	Apr. 1	3.50	210,000	1,530,000

* Monthly. † Quarterly. ‡ Semi-annually.

ASSESSMENTS.

Company.	Delinquent.	Sale.	Amount.
Best & Belcher, Nev.	Mar. 18	Apr. 8	.10
Century, Cal.	Mar. 14	.....	.06
Con. St. Gothard, Cal.	Mar. 18	.....	.05
La Palma, Mex.	Mar. 16	.....	.06
Mexican, Nev.	Mar. 14	Apr. 5	.15
Occidental, Nev.	Mar. 10	Mar. 31	.05
Potosi, Nev.	Mar. 16	Apr. 7	.10
Savage, Nev.	Mar. 11	.....	.10
Scorpion, Nev.	Mar. 17	.....	.05
Seg. Belcher & Mides, Nev.	Mar. 10	.....	.05
Sierra Nevada, Nev.	Mar. 15	Apr. 4	.10
Silver Shield, Utah.	Mar. 3	Mar. 19	.03

STOCK QUOTATIONS

NEW YORK.

Company.	Par val.	Feb. 24 H.	Feb. 24 L.	Feb. 25 H.	Feb. 25 L.	Feb. 26 H.	Feb. 26 L.	Feb. 27 H.	Feb. 27 L.	Feb. 29 H.	Feb. 29 L.	Mar. 1 H.	Mar. 1 L.	Sales.
Acacia	$1													
Amalgamated, c.	100	46⅛	45	47⅜	45⅝	47⅛	46⅛	46¾	46¼	46¾	45¾	47⅜	46⅝	134,406
Anaconda, c.	26					65	64	65						517
Anaconda, g.	5													
Belcher, s.	3	30												400
Best & Belcher, s.	3													
Brunswick, g	5	06						05		05				1,000
Bullion, s.	1													
Caledonia, s.	1													
Challar, s., g.	2½	20								20		17		700
Confidence	3					1.00		1.00						500
Con. Cal. & Va., g. s.	2½	1.65		1.75		1.75						1.55		550
Con. Imperial, s.	1													
Creede & C. Ck., g.	1											03		500
Cripple Creek, g.	1							07		07				3,500
Crown Point	2½			27	26							29		600
Daly, g. s	20													
Elkton, g.	1	62						65		63		66		1,700
El Paso, g.	1													
Gold Dollar, g.	1			06	05									1,000
Gould & Curry	1			41	40									300
Greene Con., c.	10	10¼	10⅛	10¼	10⅛	10¼	10⅛	10¼	10⅛	10⅜	10¼	10¼	10⅛	8,001
Hale & Norcross	3			95						95		91	90	400
Homestake, g.	100													
Horn Silver	20													
Isabella, g.	1	37										33		1,000
Jack Pot, g.	1													500
Julia, s.	1							06	05					500
Justice, s.	2							08						500
Leadville, s. l	10													
Little Chief, g. s.	50			09										530
Mexican, s	3	1.86	1.86	1.75				1.80	1.75	1.80				600
Mollie Gibson, g.	5									07½		07		1,500
Moon Anchor, q.	5									10				500
Occidental, s.	3					80								100
Ontario, s. l.	100	4.75		4.55										60
Ophir, s.	3	4.65										4.60		300
Overman, s.	2													
Pharmacist, g.	1													
Phœnix, g.	1	11	10	10				09						3,600
Portland, g.	1			1.90				1.90						400
Potosi, s.	1											18		100
Quicksilver, Pf.	100													
Savage, s.	3	52						50				66	65	500
Sierra Nevada, s.	3					55	54							300
Silver Hill, g. s.	1					72								200
Small Hopes		25												500
StandardCon., g. s.	10			2.55										100
Tennessee, c.	25													
Union Con., g. s.	1	80								85				400
Union Copper	10	⅝		⅝								⅝	⅛	800
United, com., c.	100													
Utah, s.	1			21	20	22								1,000
White Knob, c.	10	7	6⅝	07¼		7⅝	7¼	8	7¾	8⅛	8			2,200
Work, g.	1													
Yellow Jacket, s.	3													

c—Copper. g—Gold. l—Lead. s—Silver. Total sales, 169,833 shares. † Ex-dividend. *Holiday.

BOSTON, MASS.

Company.	Par val	Feb. 24 H.	Feb. 24 L.	Feb. 25 H.	Feb. 25 L.	Feb. 26 H.	Feb. 26 L.	Feb. 27 H.	Feb. 27 L.	Feb. 29 H.	Feb. 29 L.	Mar. 1 H.	Mar. 1 L.	Sales.
AdventureCon., c	$25	2		2¼	2	2⅛	2	2¼	2⅛	2⅜				285
Aetna q.														
Allouez, c.	25	3⅜		3⅜	3⅜	3⅜	3½			3½	3⅛	3⅜	3⅜	690
Amalgamated, c.	100	46⅛	45	47⅜	45⅝	47⅜	46⅛	46¾	45¼	46¾	46	47⅜	44⅜	28,315
Am. Gold Dredg.	5													
Am. Z., L. & Sm.	25	8										8½		150
Anaconda, c. s.	25					16¼								200
Arcadian, c.	25									45				130
Arnold, c.	25													
Atlantic, c.	25			7				7⅛		7		7⅛		205
Bingham Con.	50	19½	19	20¼	19½					20	19½			392
Bonanza Dev. g.	10													
British Col., c.	5													
Calumet & Hecla	25	445		445		445		445		445	440	445	440	111
Centennial, c	25	17	16¾	17⅜	17¼	17		17	16¾	16⅞	16⅝	17⅜	17	645
Central Oil	25					7								600
Con. Mercur, g.	5			60		60		60		66	56			1,795
Copper Range	100	38½	38	39½	38½	40	38¾	39½	39	39½	38½	39⅜	39	4,991
Daly West, g. s. l	20	34	33¾	34		34½	34	34¼		34¼	34¼	34¼	34¼	1,126
†Dominion Coal	100	58½	57	57	56¾	56¼	56½	55	54½	55½	53½	56½	55	765
Preferred	100			108										1
Dominion I. & S.	100	8¼		8¼		8¼				8¼	7¾			450
Elm River, c.	12			2										50
Franklin, c.	25	8		8½		8¼		8	7⅞					345
Granby Con.	10	3⅜	3¼	3⅜		3⅜	3¼							4,050
Guanajuato Con.	5	74												300
Isle Royal Con.	25									8				10
Mass Con., c.	25	3¼	3	3¼	3	3⅛	3⅛	3⅝				3⅜	3¼	1,095
Mayflower, c.	25	50		75										210
Michigan, c.	25	4¾				4¼		4⅜		4½	4¼	4⅛		390
Mohawk, c.	25	34½	34¼	35	34½	35⅜	35	34¼		35	34⅞	35½	35	1,052
Mont. Coal & C.	25											2⅜		250
Mont'l & Boston.	5	50		55						50				375
New Idria, q.	5													
Nova Scotia St.	100													
Preferred	100													
Old Colony, c.	25							87½						50
Old Dominion, c.	25					10						10¾		200
Osceola, c.	25	54	53⅛			55				54		56	55	230
Parrot, s. c.	10	23½	23	23								23½		126
Phœnix Con, c.	25	2¼		2				2⅛		2⅛	2	1¾		530
Quincy, c.	25			82	80					83		82		138
Rhode Island, c.	25									1		1		15
Santa Fe, g. c	10													
Shannon, c.	10	8	7¾	8	7⅝	7¾		7⅝		8				945
Tamarack, c.	25							95	94					20
Tecumseh, c.	25													
Tennessee, c.	25													
Trinity, c.	25	4⅝	4⅝	4¾	4⅝	4⅝		4¾		4⅝				795
United c.	100													
United States, g.	10	20¼	19⅞	20⅜	20	20⅛	20	20⅛				20⅛	20⅛	3,380
U. S. Coal & Oil	25			83¼				83¼		9	8¾			215
Utah Con., g. c.	5	32⅜	32	32⅜	32	32¾	32⅜	32½	32¼	32⅜	31⅝	34	32¼	6,380
Victoria, c.	25	3¼	3	3¼	3			3¼		3				280
Winona, c.	25	5				5		6¼		5½				335
Wolverine, c.	25			70		72	71¼			71½		73	71⅛	135
Wyandot, c.	25	50		75		75	50	75	50	50				495

*Holiday. †Ex-dividend. ‡Assessment Paid. Total sales, 61,667 shares.
c—Copper g—Gold. l—Lead. q—Quicksilver. s—Silver.

Duluth, Minn.

Company	Par Val.	Bid.	Asked.	Company	Par Val.	Bid.	Asked.
Calumet & Arizona	$10	$110	$111	Lake Sup. & Pitts.	$10	$130	$135
Calumet & Bisbee	10	7.50	8.00	Pitts. & Duluth	10	50.00	51.00
Calumet & Cochise	10	7.50	8.00	Shakespeare			.20
Calumet & Pittsburg	10	33.50	35.00	United Mexican			.50
Higgins Dev.	10	3.00		Wolv. & Arizona	10	4.40	
Junction Dev.	10	14.00	14.50	Yaqui	10		1.50

COAL, IRON AND INDUSTRIAL STOCKS.

Company.	Par val.	Feb. 24 H.	Feb. 24 L.	Feb. 25 H.	Feb. 25 L.	Feb. 26 H.	Feb. 26 L.	Feb. 27 H.	Feb. 27 L.	Feb. 29 H.	Feb. 29 L.	Mar. 1 H.	Mar. 1 L.	Sales
Allis-Chalmers	$100	12¾												400
Preferred	100											56		300
Am. Agr. Chem	100			13¼										120
Preferred	100													
Am. Sm. & Ref.	100	47⅛	46⅝	47	46	46⅝		47	46¾	47¾	47¼	47⅛	47	3,668
Preferred	100	90	89¾	89¼		90	89⅞	90		90	89⅞	90		1,870
Col. Fuel & I.	100	30¼	30	31		30½				30¾		31		920
Preferred	10													
Col. & H. C. & I.	100	13	12⅛	12¼	12¾	12⅝	12¼	12¼	11¾	12⅛	12⅛	12	11⅝	1,500
*Crucible Steel	100	23¾				4								140
*Preferred	100	27⅛	27¼	27¼		27½	27¼	23¼						427
General Chem.	100									43½		43		200
Preferred	100													
*Mong. R. Coal	50													
*Preferred	100					24½	24½			24		24	23	431
National Lead	100	14⅛	14¼	14⅛								14⅝		700
Preferred	100	83½		83										290
*Phila. Nat. Gas	100	38¾				38¾								70
*Preferred	100													
*Pittsburg Coal	100			12½	12¼			13						400
*Preferred	100	48⅛		49	48⅜	48⅞	48½	48⅜	48¼	48¼	48⅛	48		240
Republic I. & S.	100	7		7⅜						7⅜				1,110
Preferred	100	43¼	41					41		43				510
Sloss-Shef S. & I.	100	36¾				37		36¾				37		400
Preferred	100	78¾		80¼				81				80¼		450
†Standard Oil	100	601	600	610	590	615	610	614	610			615	614½	164
Tenn. C. I. & R. R.	100	35	34¼	35¾	34½									1,500
U.S. Red. & Ref.	100													
Preferred	100													
U.S. Steel Corp.	100	10¾	10⅛	10⅞	10⅝	10⅞	10⅛	10⅝		10⅞	10⅝	11	10⅞	16,815
Preferred	100	55⅞	54⅜	55⅝	54⅝	55⅝	54⅜	55⅛	55⅛	56⅛	55¼	56⅝	55⅞	125,285
Va.-Car Chem.	100	28	27¼	28		28	27½					28¼	28	2,177
Preferred	100			100										150

*Pittsburg exchanges. †Holiday. ‡Ex. dividend. Total sales, 160,237.

COLORADO SPRINGS, COLO.

Company.	Par Val	Feb. 20 H.	Feb. 20 L.	*Feb. 22 H.	*Feb. 22 L.	Feb. 23 H.	Feb. 23 L.	Feb. 24 H.	Feb. 24 L.	Feb. 25 H.	Feb. 25 L.	Feb. 26 H.	Feb. 26 L.	Sales
Acacia	$1	.07¼	.07			.07⅛	.05¾	.07¼	.06⅛	.07¼	.06⅝	.07⅛	.06¼	2,000
American Con.	1													
Anaconda	5	16½	14			16	15	16	14	16	15	16	15	500
Colo. City & M.	1	03¼	3			03⅛	03	03⅛	03	03⅛	03	.03		9,000
C. K. & N.	1	19½	18			19⅛	18¾	19⅜	18½	19½	18½	.20	.19	1,000
Cripple Ck. Con.	1	.08¼	.07⅞			.08	.07⅞	.08⅜	.07¾	.07⅞	.07⅝	.07¾	.07⅝	13,500
Des Moines	1	.02⅛				.02⅛		.02⅛	.02	.02		.02¼	.02⅛	
Doctor Jack Pot	1	.10	.09			.10	.08	.09		.10	.08½	.09		
Elkton Con	1	.61½	.61			.61		.61¾		.65	.63	.64	.63¾	10,700
El Paso	1	.67¼	.66½			.68	.67	.68½	.68	.69	.68	.70	.69½	11,000
Gold Dollar Con.	1	.05¼	.05⅛			.05¼	.05	.05¼	.05⅛	.05¼	.05⅛	.05⅜	.05⅛	4,500
Gold Sovereign	1	.04⅛	.04			.04⅜	.03⅝	.04⅛	.03⅞	.04	.03¾	.03⅞	.03⅝	3,000
Golden Cycle	1	.50				.51⅛	.51	.51¼	.51	.51¾	.51½	.52	.51	2,500
Golden Fleece	1	.04				.04		.04		.04		.04		
Hart	1	.02½				.02½		.03		.03	.02½	.03	.02½	1,000
Isabella new	1	.37	.36			.38½	.33	.33½	.31	.32	.30	.33	.30	2,250
Jack Pot	1	.09	.07½			.09	.07¾	.07¼		.09	.06⅞	.09	.07	1,000
Keystone	1	.04	.03¾			.04	.03⅝	.04	.01¼	.04½	.04	.04¼	.04⅜	10,000
Last Dollar	1	.05				.45		.45		.45		.45		
Lexington	1					.04⅝	.04⅜	.04⅝	.04⅜	.04¾	.04¼	.04⅜	.04¼	2,000
Little Puck	1	.04	.03¾			.03⅝	.03½	.03⅝	.03½	.03¾	.03⅜	.03⅜	.03⅛	37,000
Mollie Gibson	1	.05				.09	.05	.08¾	.05	.07	.06	.07½	.06	
Moon-Anchor	5	.12	.10½			.11	.10	.11	.10½	.11	.10	.10½	.09	2,750
New Haven	5	.02¼	.02⅜			.02¾	.02⅜	.02¼	.02⅜	.02¾	.02¼	.02⅝	.02½	6,000
Old Gold	1	.10¼	.10			.10¼	.10	.10⅜	.10	.10¼	.10	.10¾	.09¾	16,500
Pharmacist	1	.04½	.04			.04⅜	.04	.04¼	.04	.04¼	.04	.04⅜	.04¼	4,000
Pinnacle	1	.04¼				.04	.03	.04		.04		.04		
Portland	1	2.00				1.95		1.95	1.50	1.95	1.50	1.95	1.75	
Vindicator Con.	1	.64				.65		.65		.66	.65	.68	.66	2,800
Work	1	.06¾	.06⅜			.06¾	.06¼	.06⅞	.06⅜	.06¾	.06⅜	.06¾	.06⅛	2,000
	1													

*Holiday. Total sales, 142,800 shares.

COLORADO SPRINGS (By Telegraph).

Company.	Feb. 29. H.	Feb. 29. L.	Mar. 1. H.	Mar. 1. L.	Company.	Feb. 29. H.	Feb. 29. L.	Mar. 1. H.	Mar. 1. L.
Anaconda	.16	.15	.16	.15	Jack Pot	.09	.06⅝	.09	.06⅝
Cripple Ck Con.	.07⅞	.07⅜	.07¾	.07⅜	Last Dollar	.45	.40	.45	.40
C. K. & N.	.20	.19	.20	.19	Mollie Gibson	.08½	.05½	.08½	.05
Doctor-Jack Pot	.09¾	.08¾	.09¾	.08¼	Moon Anchor	.11	.10	.11	.09
Elkton Con	.65	.63½	.69	.65	Old Gold	.10	.09⅞	.10	.09⅞
El Paso	.70½	.70	.72	.71	Pharmacist	.04½	.04⅛	.04⅛	.04⅛
Gold Dollar Con.	.05¼	.05	.05¼	.05	Portland	1.95	1.75	1.95	1.50
Gold Sovereign	.04	.03¾	.04	.03¾	Vindicator	.66	.64	.65	.63
Isabella	.34	.32	.33	.32	Work	.06¾	.06¼	.06⅝	.06½

SAN FRANCISCO.

Company.	Location.	Feb. 18 H.	Feb. 18 L.	Feb. 19 H.	Feb. 19 L.	Feb. 20 H.	Feb. 20 L.	Feb. 22* H.	Feb. 22* L.	Feb. 23 H.	Feb. 23 L.	Feb. 24 H.	Feb. 24 L.	Sales
Central Eureka	Cal.									.81				300
Dutch M. & M. Co	Cal.									.40				100
Golconda	Ore.													
Golden Anchor	Nev.									.23				100
Hannapah	Nev.													
Lightner Mg. Co.	Nev.													
MacNamara	Nev.			.18		.18				.20	.19	.20	.18	2,300
Mont. Tonopah	Nev.	1.40	1.37	1.40		1.40				1.37½	1.35	1.37½	1.35	6,950
Penna. C. M. Co.	Cal.													
South Eureka	Cal.													
Ton. Belmont	Nev.	.58	.50	.52	.50	.52	.48			.50	.47	.51	.50	17,138
Ton. Midway	Cal.	.40		.41	.40					.40	.39			2,600
Ton. Mg. Co	Nev.									6.25	6.00			200
Ton. North Star	Nev.	.36		.35		.34				.33		.33		2,400
Ton. & Salt Lake	Nev.													
Ton. Superior	Nev.			.07										500

*Holiday. San Francisco and Tonopah Mining Exchange. Total sales, 32,588 shares.

SAN FRANCISCO (By Telegraph).

Company.	March Feb. 29	March 1.	Name of Company.	March Feb. 29	March 1.
Belcher	31	31	Gould & Curry	.40	.41
Best & Belcher	2.15	2.00	Hale & Norcross	.91	.94
Caledonia	1.15	1.20	Mexican	1.75	1.75
Challenge Con	.36	.35	Ophir	4.70	4.70
Chollar	.18	.18	Overman	.30	.35
Confidence	1.10	1.05	Sierra Nevada	.53	.52
Con. California & Virginia	1.60	1.55	Union Con	.85	.85
Crown Point	.28	.23	Yellow Jacket	.47	.47

STOCK QUOTATIONS

MEXICO.* Feb. 23

Company.	Shares Issued.	Prices. Bid.	Prices. Ask.
Durango:			
Ca. Min. de Penoles	2,500	$3,800	$4,100
San Andres de la Sierra	200	10,000	.....
Guanajuato:			
Angustias, Pozos	2,400	53	56
Cinco Senores y An., aviadoras	2,000	60	65
Cinco Senores y An., aviada	400	60	65
Providencia, San Juan de la Luz	6,000	65	70
Queensland y Australia	300	70	80
Guerrero:			
Delfina, 1st serie	2,500	52	55
Delfina, 2nd serie	2,500	35	40
Garduno y Anexas	7,200	35	45
Hidalgo:			
Amistad y Condordía	9,600	81	82
Carmen, aviada	1,100	80	100
Guadalupe Fresnillo Mill	1,000	170	200
Guadalupe Fresnillo Mine	1,400	70	80
La Blanca, aviadora	1,536	.....	.....
La Blanca, aviada	708	.....	.....
La Reina y An., aviadora	5,600	14	18
Luz de Maravillas, aviadas	1,100	.....	20
Maravillas y An., aviador	1,680	120	140
Maravillas el Lobo	1,000	130	180
Palma y An., aviador	1,800	14	20
Real del Monte	2,554	.....	.....
Refugio, aviada	12,800	5	7
Santa Anay An., aviadora	1,800	85	100
Santa Anay An., aviada	600	30	40
Sta. Gertrudis y An., aviadas	9,600	13	15
Sta. Gertrudis y An., aviadora	28,800	84	85
Santo Tomas Apostol aviadoras	5,100	2	3
San Felipe de Jesus, aviadora	3,600	17	19
San Felipe de Jesus, aviada	1,200	6	10
San Rafael y An., Trompillo	1,200	1,670	1,700
San Rafael y An., aviada	1,200	680	690
Soledad, aviada	960	660	680
Sorpresa, aviada	960	295	305
.....	.....	.....	.....

Name of Company.	Shares Issued.	Prices. Bid.	Prices. Ask.
Mexico:			
Alacran	2,400	20	25
Aldebarren	2,000	40	50
Buen Despacho	3,000	42	50
Dos Estrellas	3,000	1,690	1,705
La Esperanza (El Oro.)	3,000	1,500	1,500
La Reformia, aviadores	2,000	24	28
Providencia, pagadoras	1,800	.....	.....
Providencia, liberadas	800	.....	.....
Santa Ana, Esperanza	2,400	90	.....
Michoacan:			
Luz de Borda, aviadora	3,000	70	80
Luz de Borda, aviado	1,000	30	40
Santiago y An., Tlal.	4,000	4	7
Nuevo Leon;			
La Fraternal	1,000	580	620
Norias de Bajan	1,000	880	920
San Luis Potosi:			
Concepcion y An	3,000	73	80
El Barreno, aviadora	2,000	48	50
Sta. Maria de la Paz	2,400	160	165
San Diegoy Annexas	2,400	8	10
Zacatecas:			
Asturiana y An	2,500	35	50
Candelaria y Pinos	2,500	130	140
Cubiertas	2,400	.....	.....
Esperanza y An	2,400	6	8
Lourdes	2,500	22	27
Luz de Minillas, pagadoras	2,000	15	30
Nueva Quebradilla, aviadoras	2,400	85	95
Nueva Quebradilla, aviadas	600	70	80
San Carlos y Annexas	2,500	50	60
Sta. Maria de Gaud	2,500	64	70
Miscellaneous:			
Bartolome de Medina	2,000	78	80
Guadalupe Hacienda	20,000	.....	.....
La Luz Hac. (Pachuca.)	3,750	.....	.....
La Reina (Chihuahua.)	192	.....	.....
Naica (Chihuahua.)	100	11,000	13,000
Natividad (Oaxaca) aviadora	1,800	950	100
Natividad (Oaxaca) aviadas	600	.....	.....
San Francisco Hac	6,000	64	70
Santa Ana Huantla Morelos	4,000	.....	.....
Union Hacienda	3,000	215	230

*Values are in Mexican currency.

TORONTO, ONT. Feb. 27

Company.	Par val	Prices. High.	Prices. Low.	Sales
Black Tail, g	$1	.04	.02	.....
Cariboo-McKin	1	.04	.02	.....
Cariboo-Hydr	1	.70	.....	.....
Center Star, g, s	1	.24	.21½	.....
Crows Nest, C.C	100	2.60	2.00	.....
Dominion Coal	100	.59	.56	.....
Dominion S. & I.	100	.09	.08	.....
Fairview, g, s	1	.03½	.02	.....
Giant, g, s	1	.02½	.01½	.....
Deer Trail, g, s	1	.02	.01	.....
Iron Mask, g, s	1	.06	.....	.....
Morrison, g, s	1	.04	.02	.....

Company.	Par val	Prices. High.	Prices. Low.	Sales
Granby Smelter	$10	4.26	3.75	.....
Mountain Lion, g	1	.18	.10	.....
North Star, g, s	1	.10	.07	.....
Nova Scotia Steel	100	.....	.....	.....
Payne, s, l	1	.12½	.08	.....
Rambler Carib	1	.35	.25	.....
Republic, g	1	.03	.....	.....
St. Eugene, g, s	1	.42	.36	.....
Virtue, g, s	1	.07	.06	.....
War Eagle Con	1	.15	.09	.....
Sullivan, g, s	1	.06	.03	.....
Winnipeg, g, s	1	.04	.03	.....
Wonderful, g, s	1	.03	.02	.....

g—Gold. l—Lead. s—Silver. Total sales, none.

SALT LAKE CITY.* Feb. 27

Company	Par Val	High	Low	Sales.
Ajax	10	.05¾	.05½	9,700
Butler Liberal	....	.10¼	.10¼	2,250
Carisa	1	.08¼	.08	2,000
Century	1	76⅛	76	230
Con. Mercur	1	.60	.56¼	2,500
Daly	20	217½	2.20	200
Daly-Judge	....	4.15	4.60	359
Daly West	⅛	34.50	34.00	455
Dalton	....	⅛	⅛	1,000
Egl. & Blue Bell	....	.50	50	2,000
Ingot	1	.01¾	.01⅝	1,500
Joe Bowers	⅛	⅛	⅛	2,000
La Reine	....	.03¼	03	3,000
Little Chief	....	.01⅛	.01	10,500

Name of Company	Par Val	High	Low	Sales.
L. Mammoth	⅛	42	.41½	1,000
May Day	....	.07	.07	2,500
Mammoth	....	1.10	1.10	100
N. Y. Bonanza	5	.13	.11½	7,500
Petro	....	.08	.08	830
Sacramento	1	.22	.21	2,600
Silver Shield	1	.01	.01	2,750
Star Con	....	.17¾	.16	4,800
Swansea	1	.27½	.27½	100
Tetro	....	.34	.33	4,900
Utah	1	.55	.55	600
Wabash	1	½	½	2,933
Yankee Con	....	.48¼	.34½	2,400

*By our Special Correspondent. All mines are in Utah. Total sales, 70,647 shares.

PHILADELPHIA, PA.

Company.	Par val.	Feb. 24 H.	Feb. 24 L.	Feb. 25 H.	Feb. 25 L.	Feb. 26 H.	Feb. 26 L.	Feb. 27 H.	Feb. 27 L.	Feb. 29 H.	Feb. 29 L.	Mar. 1 H.	Mar. 1 L.	Sales
Am. Cement	$10	.....	.....	.....	.....	7⅜	.....	.....	.....	7¼	.....	7⅛	7	450
Cambria Iron	50	46½	.....	.....	.....	.....	.....	46½	.....	.....	.....	.....	.....	12
Cambria Steel	50	19	18⅝	19	.....	18⅞	.....	19	.....	19	.....	19¼	18⅞	923
Pa. Steel, pfd	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Susq. I. & S	5	.....	.....	.....	.....	.....	.....	.....	.....	83	82¾	.....	.....	.....
United Gas I.	50	83	82½	83⅛	82¾	83¼	82¾	83	.....	.....	.....	83	.....	2,238
Lehigh Nav'n	50	66⅛	.....	66	.....	.....	.....	.....	.....	65½	.....	.....	.....	52
Philadelphia	50	38⅛	38¼	39	38⅝	39	38⅛	38⅞	.....	38⅞	.....	38¼	38⅛	2,609
U.S. Steel	100	10⅜	10½	10⅝	10⅝	10⅝	10⅜	.....	.....	10⅞	.....	10⅞	10¾	6,425
U.S. Steel. pf.	100	55⅛	54⅛	55¼	54⅛	55⅝	54⅞	55⅝	55¼	56½	55⅝	56⅝	56½	10 400

†Ex-Dividend Total sales 23,109.

LONDON. Feb. 19

Company.	Shares Issued.	Par value. £. s. d.	Latest dividend. Amt. s. d.	Latest dividend. Date.	Quotations. Buyers. £. s. d.	Quotations. Sellers. £. s. d.
American:						
Alaska-Treadwell	200,000	5 0 0	1 6	Jan., 1904	4 5 0	4 7 6
Anaconda	1,200,000	5 0 0	2 0	Nov., 1903	3 2 6	3 5 0
†Camp Bird	820,000	1 0 0	9	Feb., 1904	1 3 9	1 6 3
Copiapo	112,500	2 0 0	6 10	May, 1903	1 5 0	1 10 0
De Lamar	80,000	1 0 0	2 0	Oct., 1903	10 0	12 6
El Oro	1,080,000	1 0 0	9	Jan., 1904	1 1 3	1 3 9
Frontino & Bolivia	128,682	1 0 0	3 0	July, 1901	5 0	7 6
Le Roi	200,000	5 0 0	5 0	Nov., 1899	17 6	1 0 0
Le Roi No. 2	120,000	5 0 0	1 0	Feb. 1904	13 9	16 3
Montana	657,128	1 0 0	6	April, 1899	1 0	1 6
Standard	500,000	4 0	2½	Sept., 1903	3 0	4 0
Stratton Independence	1,000,007	1 0 0	6	Dec., 1903	4 3	4 7
St. John del Rey	546,285	1 0 0	6	Dec., 1903	14 6	15 6
Tomboy	300,000	1 0 0	1 0	June, 1902	1 7 6	1 12 6
Utah	300,000	1 0 0	6 3	Jan., 1904	6 10 0	6 15 0
Ymir	200,000	1 0 0	1 0	Mar., 1902	2 6	5 0
European:						
Linares	15,000	3 0 0	1 0	Mar., 1903	2 0 0	2 10 0
Mason & Barry	185,172	1 0 0	11 0	May, 1903	3 10 0	3 15 0
Rio Tinto	325,000	5 0 0	32 6	Nov., 1903	47 0 0	47 5 0
Rio Tinto, preferred	325,000	5 0 0	2 6	Nov., 1903	5 12 6	6 2 6
Tharsis	625,000	2 0 0	6 0	May, 1903	4 5 0	4 10 0
West Australian:						
Associated	495,388	1 0 0	2 0	Jan., 1904	2 17 6	3 0 0
Cosmopolitan	400,000	1 0 0	1 0	May, 1903	15 9	16 3
Golden Horseshoe	300,000	5 0 0	6 0	Nov., 1903	8 2 6	8 5 0
Great Boulder	1,750,000	2 0	9	Dec., 1903	1 7 0	1 7 6
Great Fingall	250,000	1 0 0	6 0	Jan., 1904	8 3 9	8 6 3
Ivanhoe	200,000	5 0 0	5 0	Jan., 1904	8 15 0	8 17 6
Kalgurli	120,000	1 0 0	2 6	Jan., 1904	5 15 0	5 17 6
Lake View	250,000	1 0 0	rts.	Aug., 1902	1 3 9	1 6 3
Oroya-Brownhill	450,000	1 0 0	2 6	Dec., 1903	3 15 0	3 17 6
Miscellaneous:						
*Brilliant Central	100,000	1 0 0	1 0	Feb., 1904	2 17 6	3 2 6
Briseis	600,000	1 0 0	.....	.....	5 6	6 6
Broken Hill	980,000	8 0	1 6	Feb., 1904	1 10 6	1 11 6
Mt. Lyell	275,000	3 0 0	4 3	Sept., 1903	15 0	16 0
*Mt. Morgan	1,000,000	1 0 0	3	Feb., 1904	1 17 6	2 2 6
Waihi	497,412	1 0 0	2 6	Mar., 1904	5 1 3	5 3 9
Indian:						
Champion Reef	513,832	10 0	6 6	Jan., 1904	7 1 3	7 3 9
Mysore	566,043	10 0	4 4	Jan., 1904	6 8 9	6 11 3
Nundydroog	484,000	10 0	1 6	Nov., 1903	2 1 3	2 3 9
Ooregum	343,000	10 0	9	Dec., 1903	1 1 3	1 3 1
Ooregum, pfd	240,000	10 0	1 9	Dec., 1903	1 7 6	1 10 0
South African:						
Angelo	600,000	1 0 0	4 0	Jan., 1904	6 5 0	6 10 0
*Bonanza	200,000	1 0 0	10 0	Feb., 1904	1 17 6	2 0 0
†British South Africa	4,436,019	1 0 0	rts.	May, 1889	1 15 0	1 16 3
Cape Copper	300,000	2 0 0	4 0	Jan., 1904	2 12 6	2 17 6
Cape Copper, pfd	75,000	2 0 0	1 9	Jan., 1904	2 15 0	3 0 0
City & Suburban	340,000	4 0 0	8 0	Feb., 1904	6 11 3	6 13 9
Consol. Gold-Fields	2,000,000	1 0 0	.....	.....	5 16 3	5 17 6
Crown Reef	120,000	1 0 0	20 0	Oct., 1903	16 0 0	16 10 0
De Beers, preferred	800,000	2 10 0	10 0	Jan., 1904	18 18 9	19 1 3
De Beers, deferred	1,000,000	2 10 0	15 0	Jan., 1904	19 11 3	19 13 9
East Rand	990,000	1 0 0	5 0	Aug., 1903	6 3 9	6 5 0
*Ferreira	90,000	1 0 0	22 6	Feb., 1904	19 0 0	19 10 0
*Geldenhuis	200,000	1 0 0	6 0	Feb., 1904	5 5 0	5 10 0
Geduld	400,000	1 0 0	rts.	Mar., 1902	5 13 9	5 16 2
*Henry Nourse	125,000	1 0 0	10 0	Feb., 1904	8 2 6	8 7 6
Jubilee	50,000	1 0 0	5 0	Feb., 1904	3 17 6	4 2 6
Jumpers	100,000	1 0 0	5 0	Aug., 1899	2 12 6	2 17 6
*Langlaagte	470,000	1 0 0	2 0	Feb., 1904	3 3 9	3 6 3
†May	288,750	1 0 0	3 6	Feb., 1904	3 17 6	4 0 0
*Meyer & Charlton	100,000	1 0 0	5 0	Jan., 1904	5 2 6	5 7 6
Modderfontein	290,000	1 0 0	rts.	Apr., 1902	7 3 9	7 6 3
Namaqua	94,331	2 0 0	3 0	Dec., 1903	2 17 6	3 2 6
New Jagersfontein	200,000	5 0 0	10 0	Dec., 1903	27 17 6	28 2 6
New Primrose	325,000	1 0 0	3 0	Jan., 1904	3 12 6	3 15 0
Rand	1,795,956	5 0	4 0	Aug., 1902	9 0 0	9 1 3
*Robinson	750,000	5 0 0	5 6	Feb., 1904	9 7 6	9 10 0
*Robinson Deep	950,000	1 0 0	3 0	Jan., 1904	4 17 6	5 0 0
*Rose Deep	425,000	1 0 0	2 6	Feb., 1904	7 7 6	7 12 6
Salisbury	100,000	1 0 0	2 0	Mar., 1899	1 10 0	1 15 0
Sheba	1,075,000	1 0 0	6	July, 1899	7 6	8 9
†Village	400,000	1 0 0	3 0	Feb., 1904	6 12 6	6 17 6
Wemmer	80,000	1 0 0	10 0	Jan., 1904	10 0 0	10 10 0

*Ex-dividend. †Ex-rights.

LONDON (By Cable.)*

Company.	Feb. 24 £. s. d.	Mar. 2 £. s. d.	Company.	Feb. 24 £. s. d.	Mar. 2 £. s. d.
Anaconda	3 2 6	3 5 0	El Oro	1 2 6	1 2 6
British So. Africa	1 13 9	1 12 6	Modderfontein	7 4 4½	7 3 1½
Camp Bird	1 3 6	1 3 9	Rand Mines	8 12 6	8 15 0
Con. Gold Fields	5 8 9	5 11 3	Rio Tinto	6 15 0	46 17 6
De Beers	19 3 9	19 2 6	Simmer & Jack	1 7 6	1 7 6
East Rand	6 4 4⅛	6 4 7½	Tomboy	1 7 6	1 7 6

*Furnished by Wm. P. Bonbright & Co., 15 Wall St., New York.

PARIS. Feb. 18

Company.	Location.	Capital Stock. Francs.	Par value. Fr.	Latest divs. Fr.	Prices. Opening. Fr.	Prices. Closing. Fr.
Anzin, Coal	France			200.00	5,520.00	5,500.00
Boleo, c	Lower Cal	12,000,000	500	62.50	1,752.00	1,740.00
Champ d'Or, g	S. Africa	3,375,000	25	3.75	18.00	18.00
Courrieres, Coal	France	600,000	500	110.00	2,720.00	2,660.00
Fraser River, g	Brit. Col	250,000	25	.....	5.50	5.50
Huanchaca, s	Bolivia	40,000,000	125	2.50	73.50	73.00
Laurium, z, l	Greece	16,300,000	500	25.00	328.00	328.00
Malfidano, z	Italy	12,500,000	500	50.00	558.00	582.00
Metaux, Cie. Fran. de	France	25,000,000	500	22.50	485.00	464.00
Mokta-el-Hadid, i, l	Algeria	18,312,000	500	40.00	830.00	825.00
Nickel, n	N. Caledonia	15,000,000	250	22.50	508.00	490.00
Penarroya, Coal	Spain		500	45.00	1,080.00	1,070.00
Vielle Montagne z	Belgium	9,000,000	30	30.00	675.00	686.00
Wyoming, o	California		25	.....	354.00	356.00

c—Copper. g—Gold. i—Iron. l—Lead. n—Nickel. o—Oil. s—Silver. z—Zinc.

ST. LOUIS, MO.* Feb. 27

Name.	Par Val.	Prices. Bid.	Prices. Ask.	Name.	Par Val.	Prices. Bid.	Prices. Ask.
Am.-Nettie, Colo	$10	$0.25	$0.40	Columbia Lead, Mo.	$10	$3.00	$4.00
Catherine Lead, Mo.	10	1.40	2.00	Con. Coal, Ill	100	17.00	18.00
Central Coal & C	100	59.25	60.00	Doe Run Lead Mo.	100	110.00	115.00
Central C. & C., pf.	100	70.00	71.00	Granite Bimet. Mt.	10	.37	.45
Central Lead, Mo	100	110.00	115.00	St. Joe Lead, Mo.	10	14.75	16.00

*By our Special Correspondent.

DIVIDENDS.

GOLD, SILVER, COPPER, LEAD, QUICKSILVER AND ZINC COMPANIES.—UNITED STATES.

Name and Location of Company.		Author-ized Capital Stock.	Shares. Issued.	Par Val	Dividends. Paid 1904	Total to Date	Latest. Date.	Amt.
Acacia, g.	Colo.	$1,500,000	1,463,000	$1	.....	$57,560	Apr., 1903	$0.01
Adams, s. l. c	Colo.	1,500,000	150,000	10	.....	738,500	Oct., 1902	.05
Aetna Con., q.	Cal.	500,000	100,000	5	.....	325,000	Apr., 1900	.15
Alaska-Mexican, g.	Alaska.	1,000,000	180,000	5	$18,000	591,381	Jan., 1904	.10
Alaska-Treadwell, g.	Alaska.	5,000,000	200,000	25	150,000	5,420,000	Feb., 1904	.37½
Amalgamated, c	Mont.	155,000,000	1,550,879	100	780,430	23,583,837	Feb., 1904	.50
Am. Sm. & R.f. com	U. S.	50,000,000	500,000	100	625,000	625,000	Jan., 1904	1.25
Am. Sm. & Ref., pf.	U. S.	50,060,0 0	500,000	100	875,000	13,268,553	Jan., 1904	1.75
Anaconda, c	Mont.	30,000,000	1,200,000	25	.....	23,250,000	Nov., 1903	.50
Annie Laurie, g.	Utah	5,000,000	50,000	100	12,500	287,500	Jan., 1904	.25
Arizona, c.	Ariz.	3,775,000	.....	...	554,001	5,222,259	Feb., 1904	.....
Atlantic, c.	Mich.	1,0 0,000	40,000	25	.....	940,000	Feb., 1901	2.00
Bald Butte, g. s.	Mont.	250,000	200,000	1	25,000	1,337,148	Jan., 1904	.12½
Big Six., s. l.	Colo.	500,000	500,000	1	.....	17,500	Nov., 1903	.00½
Boston & Colo. Sm.	Colo.	750,000	15,000	50	.....	402,350	Oct., 1902	.75
Boston & Mont.	Mont.	3,750,000	150,000	25	300,000	28,625,000	Jan., 1904	2.00
Breece, l. s.	Colo.	5,000,000	200,000	25	.....	200,000	June, 1904	.05
Bunker Hill & Sull.	Idaho	3,000,000	300,000	10	63,000	1,583,000	Feb., 1904	.11
Butler-Liberal, g. s.	Utah	500,000	500,000	1	.....	2,500	Dec., 1903	.00½
Butte & Boston, c.	Mont.	2,500,000	200,000	25	200,000	1,800,000	Feb., 1904	1.00
C. K. & N., g.	Colo.	1,500,000	1,431,900	1	14,319	100,233	Feb., 1904	.01
Calumet & Arizona, c	Ariz.	2,500,000	200,000	10	350,000	700,000	Mar., 1904	1.50
Calumet & Hecla, c.	Mich.	2,500,000	100,000	25	1,000,000	84,350,000	Mar., 1904	10.00
Camp Bird, g.	Colo.	5,500,000	820,000	5	147,600	1,115,304	Feb., 1904	.18
Cashier, g.	Colo.	1,000,000	950,000	1	5,940	23,760	Jan., 1904	.00½
Centennial Eureka.	Utah	5,000,000	100,000	25	.....	2,667,700	Jan., 1902	.50
Center Creek, l. z.	Mo.	1,000,000	100,000	10	.....	110,000	July, 1903	.10
Central Eureka, g.	Cal.	4,000,000	398,425	10	15,937	251,932	Feb., 1904	.02
Central, l.	Mo.	1,000,000	10,000	100	10,000	395,000	Feb., 1904	.50
Century, g. s. l.	Utah	150,000	150,000	1	4,500	13,500	Feb., 1904	.01
Champion, c.	Mich.	2,500,000	100,000	25	.....	100,000	May, 1903	1.00
ChippewaCon., g. s. l	Colo.	150,000	150,000	1	.....	2,500	Dec., 1902	.00½
Clinton, g. s.	Colo.	100,000	1,000	100	.....	60,000	Dec., 1903	.30
Con. Mercur, g.	Utah	5,000,000	1,000,000	5	.....	1,030,000	May, 1903	.03
Continental, z	Mo.	550,000	22,000	25	8,800	61,600	Jan., 1904	.40
Daly West, g. s. l.	Utah	3,000,000	180,000	20	234,000	3,725,000	Feb., 1904	.65
De Lamar, g. s.	Idaho	400,000	67,180	5	.....	2,740,340	Oct., 1903	.48
Deadwood-Stand. pf.	So. Dak	600,000	600,000	1	.....	6,000	Dec., 1903	.01
Doctor-Jack Pot, g.	Colo.	3,000,000	2,900,000	1	.....	232,000	Aug., 1901	.01
Doe Run, l	Mo.	1,500 000	15,000	100	22,500	649,572	Jan., 1904	1 50
Elkton Con., g	Colo.	3,000 000	2,500,000	1	.....	1,404,461	Mar., 1902	.04
El Paso, g.	Colo.	2,500,000	2,450,000	1	24.500	120,795	Feb., 1904	.00½
Federal Sm., pf.	Idaho	20,000,000	105,000	100	183,750	367 500	Mar., 1904	1.75
Gemini, g. s. l.	Utah	500,000	5,000	100	50,000	1,100,000	Mar., 1904	10.00
Gold Coin, g.	Colo.	1,000,000	1,000,000	1	.....	1,230,000	Jan., 1903	.01
Gold King,	Colo.	1,000,000	936,850	1	14,053	473,109	Jan., 1904	.01½
Golden Argus, g.	Cal.	800,000	8,000	100	.....	2,000	Dec., 1902	.25
Golden Cycle, g.	Colo.	2,000,000	1,500,000	1	.....	348,750	Aug., 1903	.03
Good Hope, g. s	Colo.	50,000	500	100	.....	941,250	Jan., 1903	.25
Grand Central, g.	Utah	250,000	250,000	1	25,000	916,250	Feb., 1904	.10
Gwin, g.	Cal.	1,000,000	100,000	10	.....	426,500	Dec., 1902	.15
Hecla, s. l.	Idaho	250,000	1,000,000	¼	.....	120,000	June, 1903	.02
Hecla Con., s. l.	Mont.	1,500,000	30,000	50	.....	2,930,550	Apr., 1902	.25
Homestake, g.	S. D.	21,840,000	218,400	100	109,200	12,478,950	Jan., 1904	.25
Horn Silver, g. s. c. z. l	Utah	10,000,000	400,000	2	.....	5,362,000	Dec., 1903	.05
Independence, g.	Colo.	2,500,000	2,500,000	1	.....	281,375	Apr., 1901	.04
Internat. Nickel, pf.	U. S.	12,000,000	87,415	100	.....	349,660	May, 1903	10.00
Iowa, g. s. l.	Colo.	1,666,667	1,666,667	1	16,667	353,504	Jan., 1904	.01
Iron Silver.	Colo.	10,000,000	500,000	20	50,000	2,900,000	Jan., 1904	.10
Jamison, g.	Cal.	3,900,000	390,000	10	11,700	132,600	Jan., 1904	.03
Kendall, g.	Mont.	2,500,000	500,000	5	75,000	380,000	Feb., 1904	.05
Kennedy, g.	Cal.	10,000,000	100,000	100	.....	1,801,001	June, 1900	.05
La Fortuna, g.	Ariz.	250,000	250,000	1	.....	1,062,500	Oct., 1902	.05
Last Dollar, g.	Colo.	1,500,000	1,500,000	1	.....	240,000	Mar., 1903	.02
Liberty Bell, g.	Colo.	700,000	130,349	1	19,552	110,785	Jan., 1904	.15
Lightner, g.	Cal.	125,000	102,255	1	10,226	196,841	Feb., 1904	.05
Mary McKinney, g.	Colo.	1,000,000	1,000,000	1	.....	680,000	July, 1903	.03
May Day, g.	Utah	100,000	400,000	¼	.....	30,000	Mar., 1902	.01
Midget, g.	Colo.	1,000,000	1,000,000	1	.....	195,000	Apr., 1902	.15
Mine La Mott, l.	Mo.	3,300,000	300,000	10	60,000	300,000	Jan., 1904	.20
Mines Co. of Am.	U. S.	2,000,000	2,000,000	1	50,000	50,000	Feb., 1904	.01¼
Modoc, g. s.	Colo.	500,000	500,000	1	.....	270,000	Dec., 1903	.01
Mont. Ore Purch.	Mont.	2,500,000	81,000	25	.....	3,294,000	Sept., 1903	4.00
Mont.-Tonopah, g.	Nev.	1,000,000	885,000	1	.....	42,750	Dec., 1903	.05
Mountain, c.	Cal.	6,250,000	250,000	25	.....	3,776,250	May, 1903	1.57
Napa Con., q.	Cal.	700,000	100,000	7	.....	1,180,000	Oct., 1902	.10
Nat. Lead, com.	U. S.	15,000,000	159,054	100	.....	1,341,483	Mar., 1900	1.00
Nat. Lead, pf.	U. S.	15,000,000	149,040	100	260,820	14,232,988	Mar., 1904	1.75
Nevada Keystone, g	Nev.	1,000,000	638,877	1	19,166	61,790	Feb., 1904	.03
New Century, z.	Mo.	150,000	150,000	1	2,250	2,250	Mar., 1904	.00½
New Idria, q.	Cal.	500,000	100,000	5	60,000	580,000	Jan., 1904	.60
New Jersey, z.	U. S.	10,000,000	100,000	100	300,000	8,300,000	Feb., 1904	3.00
New Lead. Home.	Colo.	2,000,000	2,000,000	1	.....	265,500	Feb., 1902	.00⅝
North Star, g.	Cal.	2,500,000	350,000	10	.....	706,356	Dec., 1903	.50
Northern Light, g. s.	Utah	2,000,000	400,000	5	20,000	20,000	Feb., 1904	.05
Ontario, s. l.	Utah	15,000,000	150,000	100	.....	14,917,000	Dec., 1902	.30
Ophir, g. s.	Nev.	302,400	100,800	3	25,200	1,621,000	Jan., 1904	.25
Osceola, c.	Mich.	2,500,000	96,150	25	96,150	4,343,450	Jan., 1904	1.00
Parrot, c.	Mont.	2,300,000	229,850	10	.....	5,772,935	Jan., 1902	.02
Pennsylvania, g.	Cal.	5,150,000	51,500	100	10,300	197,375	Feb., 1904	.10
Portland, g.	Colo.	3,000,000	3,000,000	1	180,000	4,837,080	Jan., 1904	.06
Quicksilver, pf.	Cal.	4,300,000	43,000	100	.....	1,931,411	May, 1903	.50
Quincy, c.	Mich.	2,500,000	100,000	25	250,000	14,370,000	Feb., 1904	2.50
Red Bird, g. s. c. l.	Mont.	1,500,000	300,000	5	.....	36,000	Dec., 1903	.01
Rob Roy, z.	Mo.	15,000	13,825	1	277	2,530	Jan., 1904	.02
Sacramento, g.	Utah	5,000,000	1,000,000	5	.....	193,000	Dec., 1903	.00½
St. Joseph, l.	Mo.	6,000,000	375,000	10	.....	3,834,500	Dec., 1903	.15
Silver Hill, g. s.	Nev.	180,000	180,000	1	9,000	37,800	Jan., 1904	.05
Silver King, g. s. l.	Utah	3,000,000	150,000	20	200,000	7,550,000	Feb., 1904	.66⅔
Smuggler, s. l. z.	Colo.	1,000,000	1,000,000	5	.....	2,175,000	Feb., 1902	.01
Spearfish, g. pf.	So. Dak	1,000,888	882,000	1	.....	97,020	Nov., 1903	.01
Specie Payment, g.	Colo.	1,000,000	1,000,000	1	.....	40.190	Oct., 1902	.01
Standard Con., g. s.	Cal.	2,000,000	178,394	10	17,839	4,186,009	Feb., 1904	.10
Standard, c.	Ariz.	500,000	500,000	1	.....	40,000	Sept., 1903	.05
Stratton's Independ.	Colo.	5,500,000	1,000,007	5	.....	4,130,980	Dec., 1903	.12½
Swansea, s. l.	Utah	500,000	100,000	5	.....	330,500	June, 1902	.05
Tamarack, c.	Mich.	1,500,000	60,000	25	90,000	8,580,000	Jan., 1904	1.50
Tennessee c.	Tenn.	5,000,000	175,000	25	218,750	437,500	Jan., 1904	1.25
Tomboy, g. s.	Colo.	1,500,000	300,000	5	.....	1,244,000	July, 1902	.24
Tonopah-Alpine, g.	Nev.	700,000	700,000	1	.....	70,000	Dec., 1903	.10
Town Topics, g. s.	Colo.	1 000,000	1,000,000	1	.....	50,000	Nov., 1903	.00½
Trinity County, g.	Cal.	1,000,000	99,003	10	.....	34,561	July, 1903	.05
United, (Creede) g.	Colo.	500,000	500,000	1	.....	45,000	May, 1904	.02
Union, g.	Colo.	1,250,000	1,250,000	1	.....	445,244	Jan., 1903	.02
United, c. pf.	Mont.	5,000,000	50,000	100	.....	450,000	Nov., 1903	3.00
United, Cripple(Ck)g.	Colo.	5,000,000	3,994,709	1	.....	319,933	Jan., 1902	.01
United, z. l., com.	Mo.	5,000,000	78,900	7	.....	30,725	Oct., 1903	.05
United, z. l. pf	Mo.	1,000,000	18,988	25	.....	125,356	Oct., 1903	.50
United Verde, c.	Ariz.	3,000,000	300,000	10	450,000	15,510,322	Feb., 1904	.75
U. S. Red. & Ref., com	Colo.	6,000,000	59,188	100	.....	414,078	Oct., 1903	1.00
U. S. Red. & Ref., pf.	Colo.	4,000,000	39,458	100	.....	472,821	Oct., 1903	1.50
Utah, g.	Utah	1,000,000	100,000	10	.....	221,000	Dec., 1903	.01
Utah Con., c.	Utah	1,500,000	300,000	5	450,000	2,138,000	Jan., 1904	1.50
Vindicator Con., g.	Colo.	1,500,000	1,100,000	1	.....	1,115,000	Oct., 1903	.03
Waldorf, g.	Colo.	3,000,000	3,000,000	1	.....	47,000	July, 1903	.00¼
Wasp No. 2, g.	So. Dak	500,000	147,900	1	.....	218,410	June, 1902	.00½
Wolverine, c.	Mich.	1,500,000	60,000	25	210,000	1,530,000	Apr., 1904	3.50
Yankee Con., g. s. l.	Utah	500,000	500,000	1	.....	75,000	Apr., 1902	.05
yellow Aster, g.	Cal.	1,000,000	100,000	10	.....	553,789	Dec., 1903	.10

COAL, IRON AND INDUSTRIALS.

Name and Location of Company.	Author-ized Capital Stock.	Shares. Issued.	Par Val	Dividends. Paid 1904.	Total to Date.	Latest. Date.	Amt.
Ala. Con., C. & I., pf	$2,500,000	$24,638	$100	$43,117	$732,797	Mar., 1904	$1.75
Ala. & Ga. Iron, pf.	650,000	6,500	100	.....	6,500	Jan., 1903	1.00
Allis-Chalmers, pf.	25,000,000	200,000	100	$350,000	3,213,750	Feb., 1904	1.75
Alma Oil	400,000	380,000	1	.....	45,600	Dec., 1903	.03
Amer. Agr. Chem., pf.	20,000,000	181,350	100	.....	4,670,760	Oct., 1903	3.00
American Cement.	2,100,000	200,000	10	80,000	620,000	Jan., 1904	.40
American Coal	1,500,000	50,000	25	62,500	1,495,000	Mar., 1904	1.25
Aztec Oil	250,000	235,000	1	.....	43,050	Sept., 1903	.03
Bon Air C. & I., pf.	2,500,000	18,803	100	28,205	165,141	Jan., 1904	1.50
Cambria Steel	50,000,000	900,000	50	675,000	7,125,000	Feb., 1904	.75
Central C. & C., com.	5,125,000	51,250	100	76,875	628,125	Jan., 1904	1.50
Central C. & C., pf.	1,875,000	18,750	100	23,437	820,409	Jan., 1904	1.25
Central Oil	1,500,000	60,000	25	15,000	167,500	Feb., 1904	.25
Colo. Fuel & I., com	38,000,000	239,310	100	.....	1,642,500	Apr., 1902	1.75
Colo. Fuel & I., pf.	2,000,000	20,000	100	.....	1,560,000	Feb., 1903	4.00
Colum. & Hock. C. & I	7,000,000	69,244	100	17,311	103,842	Feb., 1904	.25
Consolidated Coal	5,000,000	50,000	100	50,000	350,000	Jan., 1904	1.00
Consolidation Coal.	10,250,000	102,500	100	410,000	6,946,650	Feb., 1904	4.00
Crucible Steel, pf	25,000,000	250,000	100	.....	5,250,000	Sept., 1903	1.75
Cummings Cement.	300,000	3,000	100	.....	216,000	July, 1903	9.00
Dabney Oil	1,000,000	1,000,000	1	37,500	182,500	Feb., 1904	.03¾
Empire S. & I., pf	5,000,000	23,700	100	.....	367,350	July, 1903	1.00
Fairmont Coal	12,000,000	120,000	100	240,000	240,000	Feb., 1904	2.00
Four Oil	300,000	208,700	1	4,174	60,536	Feb., 1904	.01
General Chem., com	12,500,000	74,103	100	.....	1,300,5 7	Dec., 1903	1.25
General Chem., pf.	12,500,000	100,000	100	300,000	2,875,178	Apr., 1904	1.50
Giant Oil	800,000	800,000	1	.....	144,000	Jan., 1903	.02
Higgins Oil	2,500,000	17,609	100	.....	86,850	Apr., 1902	1.50
Home Oil	100,000	100,000	1	.....	492,500	June, 1903	.05
Houston Oil, pf.	7,500,000	75,000	100	.....	886,500	Feb., 1903	3 00
Imperial Oil	1,000,000	100,000	100	40,000	540,000	Feb., 1904	.20
Int'l Acheson, pf.	500,000	5,000	100	.....	105,000	July, 1903	3.50
Jeff. & Cl'f. C. & I. com.	1,500,000	15,000	100	.....	180,000	Aug., 1903	5.00
Jeff. & Cl'f. C. & I., pf.	1,500,000	15,000	100	37,500	638,000	Feb., 1904	2 50
Lehigh Coal & Nav.	14,346,650	286,933	50	.....	21,041,449	Nov., 1903	1.50
Maryland Coal, pf.	2,000,000	18,850	100	.....	1,046,135	Dec., 1903	5 00
Monong. R. Coal, pf	10,000,000	97,300	$ 5	347,165	3,471,510	Jan., 1904	3.50
Monte Cristo Oil	500,000	500,000	1	.....	35,000	Nov., 1903	.01
National Carbon, pf.	4,500,000	45,000	100	78,750	1,053,750	Feb., 1904	1 75
New Central Coal	1,000,000	50,000	20	20,000	270,000	Mar., 1904	.40
Ohio & Ind. Gas.	10,000,000	900,000	100	.....	1,440,000	Dec., 1903	1.00
Pacific Coast Borax.	2,000,000	19,000	100	38,000	1,573,500	Feb., 1904	1.00
Peerless Oil	1,000,000	92,000	10	25,760	236,160	Feb., 1904	.14
Penna. Salt	2,500,000	50,000	50	.....	13,450,000	Oct., 1903	7.00
Penna. Steel	25,000,000	168,214	100	.....	3,505,750	Nov., 1903	3.50
Phila. Gas, com.	16,102,131	308,542	50	231,406	3,648,237	Feb., 1904	.75
Phila. Gas, pf.	3,988,350	212,873	50	99,959	1,109,026	Mar., 1904	1.25
Pittsburg Coal, pf.	32,000,000	287,012	100	519,771	8,836,107	Jan., 1904	1.75
Pittsburg Oil	300,000	240,000	1	.....	48,000	Dec., 1903	32½
Pocahontas Coll., pf	1,500,000	15,000	100	15,000	105,000	Feb., 1904	.50
Rep. Iron & Steel, pf	25,000,000	204,100	100	.....	6,053,476	Oct., 1903	1.75
San Joaquin Oil	100,000	100,000	1	220,000	405,000	Jan., 1904	2.20
Shelby Iron	1,000,000	10,000	100	.....	840,000	Nov., 1903	5.00
Sloss-Sheffield, pf.	20,000,000	65,085	100	114,000	1,824,000	Jan., 1904	1 75
Somerset Coal	4,000,000	40,000	100	80,000	80,000	Feb., 1904	2.00
St. Bernard C. & C.	1,000,000	10,000	100	.....	770,000	Dec., 1903	6.00
Standard Oil	100,000,000	970,000	100	15,520,000	2235,000	Mar., 1904	16.00
SundayCreek Coal, pf	150,000	1,500	100	.....	15,750	Aug., 1903	3.00
Susq. I. & S., pf.	1,500,000	300,000	5	.....	762,500	June, 1903	3 15
Temple Iron	240,000	2,400	100	.....	21,500	July, 1903	2.00
Tenn. C. I., com.	23,000,000	225,531	100	.....	1,102,600	Nov., 1900	2.00
Tenn. C. I., pf.	248,000	2,480	100	4,960	312,064	Feb., 1904	2 00
Thirty-three Oil	500,000	100,000	5	20,000	260,000	Feb., 1904	10
Thomas Iron	2,500,000	25,000	200	.....	200,000	Aug., 1903	4 00
Tidewater Steel, pf.	600,000	60,000	1	.....	30,000	July, 1903	.20
Union Oil	10,000,000	52,672	100	.....	370,870	Oct., 1903	.70
U. S. Steel Corp., com	550,000,000	5,084,952	100	.....	53,360,978	Dec., 1903	1 50
U. S. Steel Corp., pf.	550,000,000	3,603,141	100	6,305,497	99,182,490	Feb., 1904	1.75
Va.-Carolina Ch., com	38,000,000	279,844	100	.....	3,678,829	June, 1903	1 25
Va.-Carolina Ch., pf.	2,000,000	120,000	100	240,000	7,260,849	Jan., 1904	2.00
Westmoreland Coal.	5,000,000	250,000	50	.....	8,250,000	Sept., 1903	.50
West Shore Oil	100,000	100,000	1	.....	105,000	Dec., 1903	05

CANADA, CENTRAL AND SOUTH AMERICA, MEXICO.

Name and Location of Company.		Author-ized Capital Stock.	Shares. Issued.	Par val	Dividends. Paid 1904.	Total to Date.	Latest. Date.	Amt.
Amistad y Concordia	Mex.	$480,000	9,600	$50	$27,360	$192,648	Jan., 1904	$2.85
Barreno, g. s.	Mex.	.....	2,400	...	.....	63,946	June, 1903	.86
Bart. de Medina Mill	Mex.	50,000	2,000	25	5,280	85,008	Feb., 1904	1.32
Buena Vista, g. s.	Mex.	100,000	1,000	100	.....	5,000	June, 1903	5.00
Butters' Salvador, g.	Salv.	750,000	150,000	5	36,000	288,000	Feb., 1904	.24
Cariboo McKin'y, g. s.	B. C.	1,250,000	1,250,000	1	50,000	546,837	Feb., 1904	.04
Carmen, g, s.	Mex.	27,500	1,100	25	.....	78,616	Nov., 1903	.99
Carmen-Guanaj. g. s.	Mex.	725,000	145,000	5	.....	27,750	Oct., 1903	.12½
Cinco Senores	Mex.	.....	2,000	...	.....	711 935	July, 1903	4.10
Copiapo c.	Chile	1,125,000	112,500	10	.....	2,865,900	Feb., 1903	.36
Crow's Nest Pass	N. S.	3,500,000	34,505	100	83,262	882,685	Jan., 1904	2.50
Dominion Coal, pf.	N. S.	3,000,000	30,000	100	.....	2,340,000	July, 1903	2.00
Dominion I. & S. pf.	N. S.	5,000,000	50,000	100	.....	875,000	Sept., 1903	3.50
Dos Estrellas, g. s.	Mex.	150,000	3,000	50	26,250	609,075	Feb., 1904	4.35
El Oro, g. s	Mex.	5,750,000	1,080,000	5	.....	2,514,400	Dec., 1903	.18
Esperanza, s. g.	Mex.	2,275,000	455,000	5	.....	1,154,199	Aug., 1903	4.40
Fraternal, s.	Mex.	5,000	1,000	5	.....	51,263	Nov., 1903	2.18
Granby Con.	B. C.	13,363,030	1,336,303	10	.....	133,630	Dec., 1903	.10
Greene Con., c.	Mex.	8,640,000	864,000	10	.....	651,820	May, 1903	.20
Guadalupana, g. s. l.	Mex.	15,000	3,000	5	.....	69,930	Mar., 1903	.77
Guadalupe	Mex.	1,000,000	10,000	100	.....	3,515,750	Apr., 1903	.77
Le Roi No. 2. g.	B. C.	3,000,000	120,000	35	28.800	316,800	Feb., 1904	.24
Mesquital, g. s.	Mex.	125,000	250.000	½	.....	51,458	Feb., 1903	.06
Natividad, s. g.	Mex.	36,000	2,400	15	24,000	296,463	Feb., 1904	5.00
N. Y. & Hond. Ros.	C. A.	1,500,000	150,000	10	.....	1,785,000	Dec., 1903	.10
North Star, s. l.	B. C.	1,500,000	1,300,000	1	.....	581,356	Dec., 1902	.01
N. S. St. & Coal, com.	N. S.	5,000,000	41,200	100	.....	515,000	Oct., 1903	3.00
N. S. St. & Coal, pf.	N. S.	2,000,000	10,300	100	20,600	226,600	Jan., 1904	2.00
Penoles, s. g.	Mex.	125,000	2,500	50	91,000	2,579,114	Feb., 1904	18.40
Providence, g. s.	B. C.	200,000	5,560	5	.....	2,224	Dec., 1903	.10
Providencia (S. J.)	Mex.	90,000	6,000	15	.....	169,740	Feb., 1903	.77
Rambler-Cariboo, s. l.	B. C.	1,250,000	1,250,000	1	.....	230,000	Nov., 1902	.01½
Real del Monte,	Mex.	.....	2,554	...	11,238	2,938,122	Jan., 1904	4.40
Soledad, s. l.	Mex.	19,200	960	20	8,429	273,141	Feb., 1904	4.40
Sorpressa, g. s.	Mex.	19,200	960	20	4,224	204,290	Feb., 1904	2.20
San Rafael	Mex.	60,000	2,400	25	47,532	2,012,752	Feb., 1904	.....
Sta. Gertrudis, g. s.	Mex.	1,920,000	38,000	50	12,672	2,793,120	Jan., 1904	.....
St. John del Rey, g.	Brazil	3,000,000	546,265	5	.....	14,158,949	Dec., 1903	.12
Sta. Maria de la Paz.	Mex.	.....	2,400	...	5,280	1,967,653	Jan., 1904	2.20
Torreon Metallurg'l	Mex.	1,500,000	30,000	50	.....	269,500	Apr., 1903	8.98
Union Mill	Mex.	150,000	3,000	50	5,280	418,703	Feb., 1904	1.67
Waterloo	B. C.	1,200,000	1,200,000	1	3.000	3,000	Jan., 1904	.00¼

NOTE.—These dividends are published gratuitously. Readers are invited to send any additions or corrections which they think necessary to complete our list.